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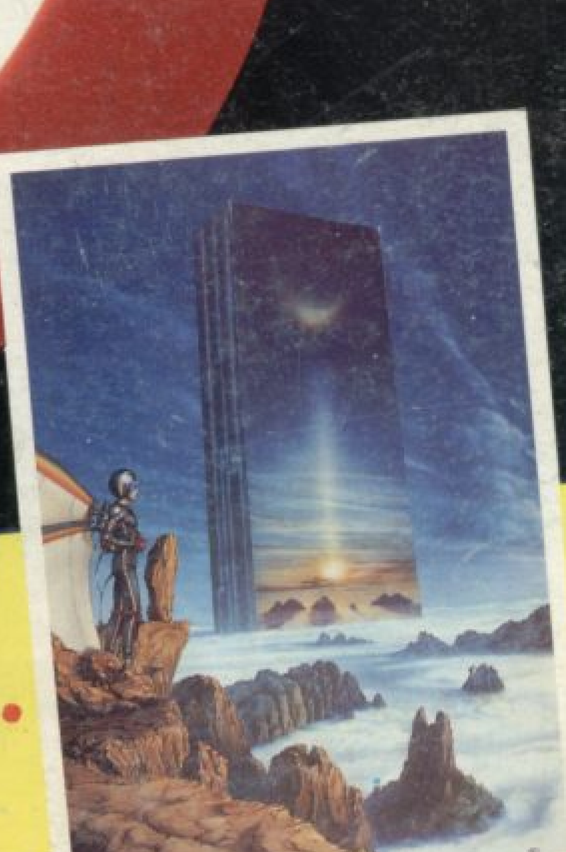


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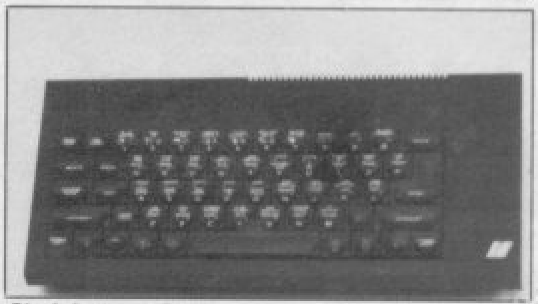
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Things that go bump in the night, page 154

PLUS

QUALITY CONTROL FROM CREATIVE SPARKS ON SPECTRUM 48K

For those who demand excellence





STAGECOACH

A western action game for your Spectrum which really does provide something quite different and exciting. You are Kidd Rivers, the hero of the game and you must leap aboard the runaway stage and guide it safely over the plains and through the treacherous mountains. Then just as you thought you were safe, fight off the attacking Indians.

BLACK HAWK

You're flying the world's deadliest aircraft, however it would appear that your Command Centre has just sent you on the world's deadliest mission.

The ultimate in strategic action. This 100% machine code game offers the player two full graphic scrolling screens with over 30 levels of play.

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Delta Wing is an advanced flight combat simulator. It has been designed to give an excellent 'feel' for the tumble and roll of high speed flight. With 15 separate controls to monitor and incoming enemy planes to be dealt with, this program takes you and your Spectrum to the limits.

Delta Wing also allows TWO Spectrum computers to play against each other through the use of two Interface 1's.

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THE QL FAIRY TALE

CHRISTMAS is fast approaching and we will soon be in the pantomime season once again. No-one who saw it will easily forget last year's hit production of 'QLinderella'.

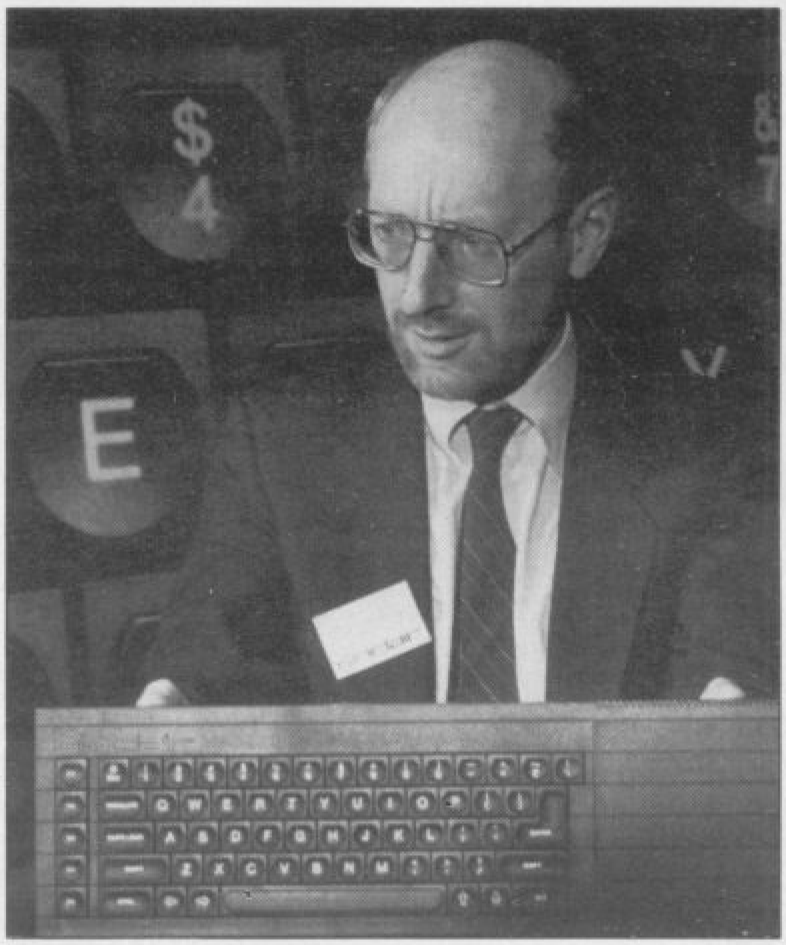
It was a wonderful show, combining as it did elements of drama, suspense, humour and excitement. It was not without its sad moments too and provided a mixture of hope and disappointment for quite a few people. In the Sinclair version there was a reverse of the usual order of the plot. In the first scene QLinderella appeared at the Ball and made a stunning entrance. She was greeted by cries of admiration from the whole assembly. Prince Consumer thought her utterly charming.

Sadly, after only 28 days her finery turned to rags and she disappeared leaving only a silicon slipper behind. Nothing daunted, Prince Consumer pursued her eagerly but had some difficulty in finding her. And when he did get the occasional glimpse he could have been forgiven for wondering if this was the same ravishing creature he first saw at the Ball. Some of the town criers now began to pour scorn on her and hinted that perhaps she was not a real princess after all but a mere kitchen maid. . .

The tale is not yet ended and the curtain is just going up for the next Act. Will the story have a happy ending? Will Prince Consumer find and marry QLinderella? Or will he perhaps settle for one of her ugly sisters?

Oh yes he will!

Oh no he won't!



It is almost a year since the QL was launched and the machine is only now in the shops. We have seen a saga of slipped delivery dates, misleading information, poor support, poorly finished hardware, bugged software, flawed or missing documentation and to add insult to injury the company has already announced that supplies are likely to be limited for the immediate future.

For many computers, that would almost certainly have spelled total disaster.

However, few other machines have the advantage of having a Fairy Godfather like Sir Clive Sinclair. Whatever the difficulties may have been it is impossible to ignore the magic of a company with such a brilliant track record of low priced technical innovation and the proven ability to produce and sell computers by the million. For that reason alone, the QL remains a potential winner.

It is to be hoped that the production problems are now a thing of the past. There are QLs available over the counter and the company has said it plans to increase production to 50,000 units a month with further manufacturers shortly to join the existing source. With more than 20,000 QL owners already there is the beginning of a healthy user base.

Software is still limited in variety but the building blocks for the chart toppers of the future are already appearing—assemblers, disassemblers, editors and alternative operating systems. The Psion QL Chess program has already won this year's Microcomputer Chess Championship which augurs well for the quality of QL software.

Sinclair is keen to establish the credibility of the machine for serious use and has approached a number of leading business software producers—Digital Research, Quest, Sagesoft, MicroApl, Scicon and others—who are expected to produce new languages, accounting and communications programs. The QL delays may, however, have discouraged some of the smaller produers who have been engaged in a slow bicycle race waiting to see if the computer really will take off. There are books by the bushel. Upwards of fifty QL titles have been published or are due to appear shortly.

From that point of view the prospects look good, but there are still a number of doubts. Eventual success will depend on the ability of the QL to find the correct niche in the market. Some people feel it falls uneasily between two stools. Enthusiasts might buy it as a cheap 68000 development system and for languages like BCPL and Unix which may soon be available. In general, though, it is probably a little expensive as a home/games machine.

Then there are the small business users. The QL may offer features only available elsewhere at several times the price, but then business users are less impressed by the bells and whistles of advanced technology and more interested in boring old things like ruggedness of design, proven reliability of hardware, manufacturers back-up, widely available standard software and other similar unexciting considerations. Unlike hobbyists or home users they are not very tolerant of shortcomings.

That leaves the elusive professional user, the person who wants to use a computer for 'real work' as a professional tool. It may well be that, as with his earlier machines, Sinclair will create a new market. New users will not be prejudiced by the supposed shortcomings of the keyboard and the microdrives, or unduly worried by some of the odd omissions in the software, provided the machine is reliable and does the job.

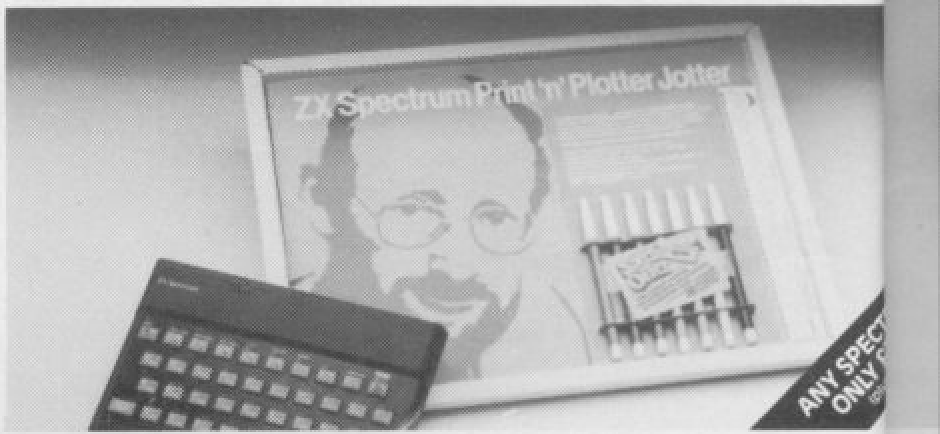
The keys to success are good software—likely to be forthcoming—and a commitment by the company to the highest standards of quality control and customer service. Sinclair Research must be only too painfully aware of that after last year's little drama. The micro market is no longer the wide open field it once was and if Sinclair can not meet the challenge, there are others hot on his heels who will.

Mike Johnston

HERE'S SIX WAYS T







PAINTBOX
Superb Graphics — without expensive hardware!

PAINTBOX is a must for every owner of a 48K Spectrum.

It will give you the ability to produce stunning graphics on your micro — simply.

With PAINTBOX there's no need for expensive hardware — why pay up to £150 for hardware when you can produce incredible picture and graphics with one cassette-based software package?

If you haven't seen PAINTBOX demonstrated you're in for a pleasant surprise!

For instance, PAINTBOX will enable you to draw practically anything on your screen and save it either as SCREEN$ or as a machine code memory file to use in your BASIC or MC programs.

You wield enormous power over the graphics capability of your SPECTRUM — including the definition, storage and use of up to 84 UDG's — 4 times more than normal! A brief description of facilities are as follows:

UDG DRAWING BOARD for defining up to 4 Banks of UDG's including ROTATE, MIRROR, INVERSE etc.

UDG EDITOR for storing up to 84 UDG's for use in screen planning or in your other programs.

PRECISION PLOTTER. A high-resolution drawing board which allows you to draw anything on the screen. Facilities like CIRCLE, FILL, ARC, PLOT, DRAW, ERASE, OVER, DRAW RADIALLY, INK, BRIGHT etc are included and easy to use!

SCREEN PLANNER gives you the best of both worlds! The combined use of PRECISION PLOTTER and your Banks of UDG's for highly detailed and precise screen graphics.

The program is complete with DEMO on side two of the cassette and a 28 page instruction booklet.

PAINTBOX can be used with Joysticks and is Sinclair Microdrive compatible.

SCREEN MACHINE
Instant Machine Code for graphics and text

SCREEN MACHINE is a completely professional graphics utility to use with Paintbox (or any other graphics hardware or software).

It will allow you to manipulate your screen graphics and text in ways which will make your programs better and more memory efficient. For instance:

If you have produced a screen-full of superb graphics you can enlarge, reduce, recolour, flip screen, relocate your graphics to another part of the screen, superimpose one screen on another and perform all sorts of other wonders!

Then you can take your results and put them through a series of memory compression routines to allow you to save enormous amounts of memory. Such items like compressing with or without attributes, saving thirds of the screen and multiple combinations of both are possible.

Never has machine code storage of graphics been simpler because SCREEN MACHINE automatically creates re-callable multiple screen files with a location catalogue so that you can add them to your programs!

SCREEN MACHINE also allows the user to program UDG's or text directly into machine code, so if your programs use a lot of text instructions or menus SCREEN MACHINE is going to save fantastic amounts of memory!

SCREEN MACHINE is a major graphics toolkit for the 48K SPECTRUM. It is completely menu-driven, Sinclair Microdrive compatible, and comes with instruction book and an unbelievable DEMO on side 2 of the cassette.

ADVENTURE PLANNER
A must for the adventure game fan

If you're an Adventure Game nut, Print 'n' Plotter's new ADVENTURE PLANNER is exactly what you have been looking for!

It's a 50 page, BIG SIZE (16¾" x 11¾") pad with a complete 'mapping' system with over 150 locations on each sheet . . . created to help you solve Adventure Games.

It's the best way to beat the 'system' and is obviously for use with any make of computer.

ADVENTURE PLANNER will also assist you in planning Adventure Games for programming — a helpful pad to keep by your computer at all times.

TO IMPROVE PROGRAMS.







ADVENTURE PLANNER is published with instructions for use, examples, hints and tips on how to play and win the game faster.

ADVENTURE PLANNER is a high quality pad, board-backed and fly-leaf cover . . . economically priced too!

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Of course it could be because it is professionally produced . . . the quality is superb.

And the fact that it is BIG SIZE A3 (16½" x 11¾") is a distinct advantage when working in high-resolution.

It's also 100 pages thick. 50 pages of PLOT grids showing each numbered pixel co-ordinate and 50 pages of PRINT grids showing every character and graphic character position and INPUT lines.

Each page also contains 24 UDG planning grids (2400 per pad).

Consider also the fact that it is printed on Artist's Detail paper . . . thick enough to take any writing, drawing or colouring, yet thin enough to overlay onto a drawing and trace-off.

For pre-planning graphics, text, tabulation or anything to produce 'on screen', a Print 'n' Plotter JOTTER won't be beaten.

The complete package comes with a set of coloured pens, a Pixel ruler and a handy corrugated storage tray.

If you use PAINTBOX, SCREEN MACHINE or any other graphics utility . . . you'll do things better with the ORIGINAL Print 'n' Plotter JOTTER!

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The simple answer to "Which key?"

Print 'n' Plotter KEYBOARD OVERLAYS for the standard ZX Spectrum keyboard are the economic answer to "Which key does what?"

If you program, or buy commercially-produced software, sooner or later you'll be faced with a mind-boggling mass of keys that perform different functions.

Let's face it, the Spectrum keyboard is complicated enough so why not take the easy way to remember . . .

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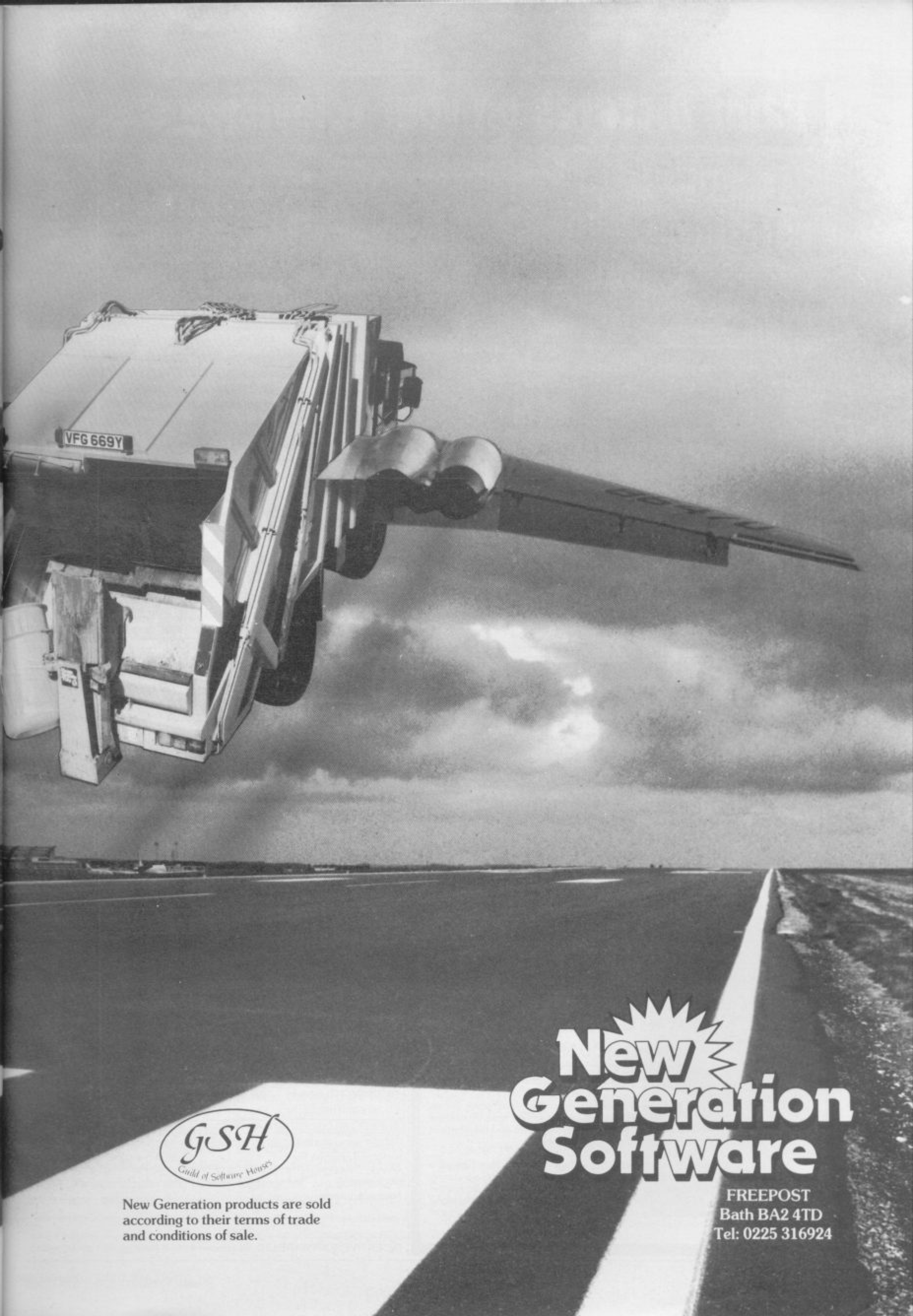
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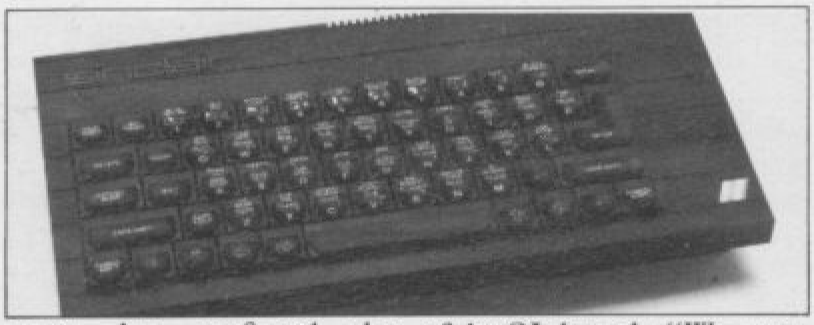
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New Spectrum launch



A SPECTRUM with a 'real' keyboard has been released by Sinclair Research. The new Spectrum sells for £179.95 and includes a new manual with colour diagrams and six items of software, including **Tasword 2, Scrabble, Chequered Flag** and **VU-3D.**

Sir Clive Sinclair says the product is aimed squarely at potential buyers of the Commodore 64. "Market research showed people thought the Spectrum was a better computer, but preferred the Commodore 64 because of its keyboard".

The decision to launch the package without advance publicity was taken because of criticism over the handling of the QL launch. "We wanted to make absolutely sure the Spectrum+ was in the shops when it was launched," says Sir Clive. "Otherwise nobody would have believed us".

Cashing in on Santa

SANTA CLAUS has been roped in to help Creative Sparks with its Christmas software push.

The company's new game **Special Delivery** for the 48K Spectrum turns the player into Uncle Santa who must be guided across the sky to drop presents on eager children. All the action is accompanied by what Creative Sparks calls suitable seasonal music.

Gordon Reid, product manager for Creative Sparks says: "Special Delivery makes an ideal Christmas gift, and games players will also be able to use it beyond the Christmas period, as it features four separate screens of play and fine animation graphics". If you want a dose of seasonal jollity then it costs £6.95 from high street stores. Ten out of ten for being quick on the ball but zero for lasting appeal.

DIY microdrives for the QL

ACCORDING to Sinclair Research it is theoretically possible to link Spectrum microdrives to the drive extension port at the righthand side of the QL.

The only problem is that the cartridge access slot must face backwards, which means that the insertion of cartridges is made very difficult.

The cable also has to be reversed in order that the connection can be made to the third microdrive. That still does not guarantee that the connection will be good enough for the ZX drive to work perfectly.

If you manage to get all the bits and pieces working then you can use the usual microdrive commands. The ZX microdrive will provide an inexpensive alternative to the QL microdrives which have yet to be launched.

Sabreman soldiers on

THE COMPANY which brought the world **Sabre Wulf,** Ultimate, has just released two sequels to the game.

The two new titles are **Underwurlde** and **Knight Lore.** The first is similar to Sabre Wulf as it takes place in the same Underwurlde with hundreds of monsters to fight in a wide variety of different locations.

Knight Lore, on the other hand, is what Ultimate describes as "the first step in the new generation of computer adventure simulation developments whch represents the very pinnacle of software development on the 48K Spectrum".

The scenario is portrayed in 3D representation with sprite aliens and monsters. The Sabreman character has over 200 individual frames and Ultimate claims that he is "the most animated character in computing software history to date".

Viewdata ban on Labour

NO SOONER had Neil Kinnock opened the Labour Party pages on the Micronet 800 database and telesoftware service than an order was sent through to shut them off from public view.

Accusations as to who gave the order have been flying from a number of sources but Dr Jeremy Bray, Labour spokesman for science and technology, puts the blame on Sir George Jefferson, chairman of British Telecom, who issued a policy directive last year that sought to make sure that videotext services did not develop a party political bias after an attempt by the SDP to advertise through Prestel during the 1983 general election.

Dr Bray put out an official statement claiming "Sir George did not check on the legality of such discrimination. To classify religion and politics with prostitution and crime while purveying share prices, exchange rates and the weather, betrays a singularly perverted view of society".

British Telecom denies that it got involved with the banning of Labour from the services public view pages. A spokesman for the company claimed that the Labour Party did not have an agreement with BT but with Telemap, an organisation which rents a large number of videotext pages from Prestel. It has to act in accordance with the Viewdata Industry Association and its practice of banning the use of pages open to the public to political parties or their viewpoints. The spokesman went on to say that it had been Telemap which had ordered the ban and that BT had brought no pressure to bear on the company.

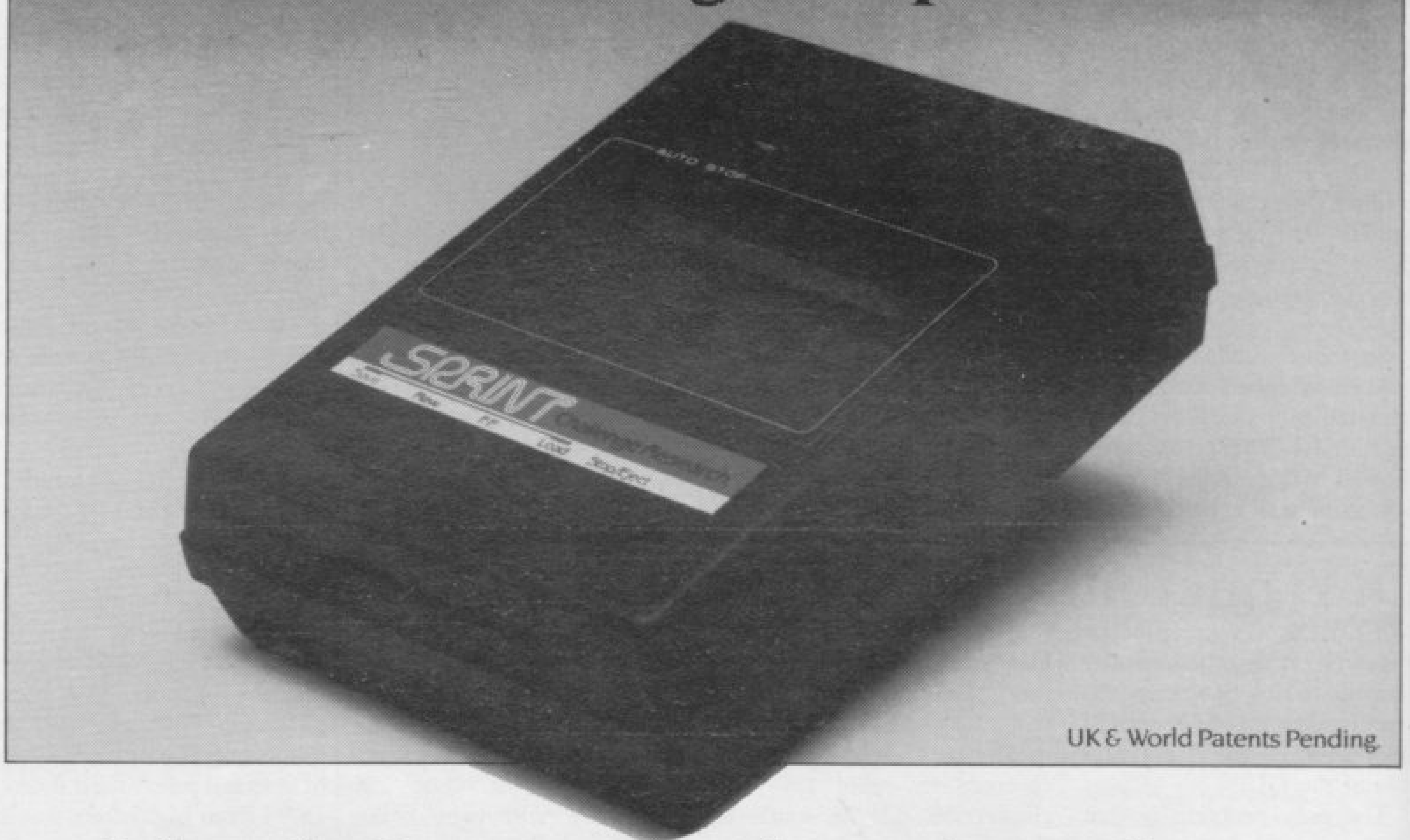
Micronet firmly denies the claim and insists that the order came down through Prestel to Telemap. Meanwhile, Dr Bray has written to Secretary for Trade and Industry, Norman Tebbit, to ask him to intervene in the dispute with BT.

He says that the pages on Micronet are important if the Labour Party is to continue its link with members using viewdata.



more news on page 13

Introducing the Sprint



UK & World Patents Pending.

It loads Spectrums four times faster than an ordinary cassette player, uses standard cassette software, and has improved loading reliability.

All for just £64.95.

The new Sprint from Challenge Research will load and save Spectrum programs at four times the speed of conventional cassette players, this even applies to standard program and games cassette software that has been pre-recorded at normal speed. All this plus improved loading reliability is available for just £64.95 inclusive of post, packing, VAT and a 12 month guarantee. The Sprint is dedicated to both the 16K and 48K Spectrum and provides an innovative but inexpensive new concept in cassette tape storage.

Use of the Sprint is simplicity itself:

- Retains the standard Spectrum commands and format.
- Advanced digital circuitry and signal processing improves loading reliability and eliminates volume setting.
- Simply plugs into the Spectrum port — no interface or external power unit is required, it even has it's own expansion slot so that you can still use other peripherals at the same time.
- A full 48K program will load or save in 75 seconds rather than five minutes with a conventional cassette recorder.

Spend less on a Sprint. Spend more time working your Spectrum and be the envy of your friends.
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The Cambridge Prince

A LUXURY reception at London's Ritz Hotel marked the presentation of the Cambridge Award, co-sponsored by *Sinclair User* and Cases Computer Simulations, by Nigel Searle, managing director of Sinclair Research.

The winning entry **The Prince,** for the 48K Spectrum, was written by John Sherry who received a trophy and a cheque for £2,000.

The four runners up, Thomas Frost of Angus, Nicholas Holgate of Camberley, David Bark of Stranraer and Stephen Thomas of Luton, were presented with cheques for £250. Their programs, together with The Prince, are to be published by CCS.

Nigel Searle was pleased that *Sinclair User* and CCS sponsored the award and for "encouraging intellectually stimulating and entertaining games". He reminded the audience comprising national and computer press, television and radio representatives that the United Kingdom "had the highest penetration of home computer ownership in the world" and referred to the need to develop software to match the increasing power of home computers.



David Bark, Nicholas Holgate, John Sherry, Nigel Searle, Stephen Thomas, Thomas Frost.

Cheap is not always nasty

OWNERS of ZX-81s can now buy budget software, under £2.00, for their machines.

A new company called Pooter Games has joined the ranks of the budget software suppliers which include such salubrious companies as Mastertronic, Pulsonic, Atlantis and Virgin Games. Its programs will not be sold by mail order but will shortly find their way into high street stores. The £1.85 range includes **Handles,** a game for CB radio enthusiasts and **Binary Brains,** for those who want to know more about binary numbers.

The Spectrum budget scene also has a new member in the form of a company which modestly calls itself Omega, the last word in software. It is made up of several computer companies such as Anirog, Computer Rental Limited and Silversoft. Its members want to cause a stir with a product standard so high many software houses would have released its first twelve games at a much higher price.

Its range of £1.99 games for the Spectrum include **Chambers of Horrors, Pool, Corruption** and **Handy Andy.** Could this be the end of the software market as we know it?

Dreaming in competition

A WEEKEND in Paris for two is the prize being offered by Star Dreams for the first person to complete its new adventure **The Sandman Cometh.**

It is a bizarre game featuring dream sequences, each set with its own series of logical problems. The program was devised and created by the same person who wrote **Aural Quest** for the Stranglers' last LP. It was written by a team of programmers in a one year period.

The game is packaged as a parody of a motion picture and opens with film-style credits and a loading screen which looks like the Board of Censors certificate.

Richard Hildrick, a 15-year-old from York was the lucky winner of a QL, first prize in a competition run by dk'tronics. He personally picked up the first prize at the company headquarters in Saffron Walden, Essex. The runners up were Andrew Fairholm, from Clifton, Rugby, Simon Harvey, from Kettering in Hants, and Mark Middleton of Morton in Lincolnshire.

Quiz fans raise £2100

THE CAMPAIGN to help sufferers of multiple sclerosis was further aided when the £2,100 royalties for **Stuart Henry's Pop Quiz** from Bellflower Software was handed over to the Radio Luxembourg disc jockey by Bucks Fizz stars Cheryl Baker and Mike Nolan.



The money has been raised by Bellflower and WH Smith from sales of the popular computer game for the 48K Spectrum which tests players' pop knowledge.

Stuart Henry suffers from the disease of the nervous system and the Multiple Sclerosis Society operates a research fund in his name. David Gordon, director of Bellflower, says: "Everyone who has bought the program so far has made a contribution to vital research into finding a cure for MS. We hope more people will take up the challenge of Stuart Henry's Pop Quiz so we can have more presentations'.

more news on page 15

If you're involved with education, then you're involved with hi-technology and computers.

THE
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23-26 January, 1985
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The face of education is changing, monitors are replacing blackboards, light pens are replacing chalk.

As an educationalist take an opportunity to get right up to date with everything that's new in high technology and computers in education. The new techniques aren't only for the science labs or computer classes, they cover all aspects of the schools curriculum, from geography to physical training.

This exhibition, the first of its kind, is a definitive showcase for both manufacturers and users alike. You can see the best the world has to offer, compare specifications and collect literature away from the bustle of day to day activities.

Entrance is free to anyone working in education and over 18 years of age. Just clip the coupon below. (To be completely up-to-date, book into the series of half-day seminar/workshops organised alongside the exhibition in co-operation with the Micro-electroncs Education Programme. For details of these and a booking form, tick the box on the coupon below.)

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SU/12/84

Imagine bounces back

BANDERSNATCH, one of the Imagine mega-games, has surfaced.

Last seen heading off into the sunset with directors Ian Heatherington and David Lawson, the game has come back to life in the Sinclair Research stables. Heatherington and Lawson are doing their best to finish a QL version for Alison Maguire, the Sinclair software manager. She says, "The games have enormous technical and marketing potential. They are at once complex, challenging and very exciting and will be ideal for the type of QL user we envisage".

The programmers are working on a fee basis for Sinclair Research but all the royalties will go to Imagine creditors via the official liquidator, Christopher Chambers, who arranged the Sinclair resurrection of the product. He says that it offers "very significant potential to recover monies for Imagine's unsecured creditors".

According to Sinclair spokesman Julian Goldsmith the new mega-game is due for release in the first quarter of next year. It could be ROM based but, he says, it is more likely to be stored on microdrive as it needs a substantial amount of memory — more than 100K.

The final format of the game has yet to be decided. Goldsmith says, "We are giving ourselves as long as possible to get it right. That would mean a release in the early or middle part of 1985".

Bargain basement

BUDGET software house Mastertronic has taken over distribution of the former Imagine titles taken on by Beau-Jolly.

The deal is backed by £250,000 of TV advertising which will cover the British ITV network. Beau-Jolly is confident of reaching a target audience of more than 20 million viewers.

Distribution and advertising will focus on special Christmas packs of games. There's a six-pack for the 48K Spectrum and a four-pack for 16K Spectrum owners. Games will include established titles such as **Arcadia** and **Alchemist** but some new games, such as **Cosmic Cruiser** and **BC Bill** will also be put into the packages.

Colin Ashby, a director of Beau-Jolly, says "Mastertronic got it right from the word go, and we are very pleased to be working with them. The market for budget games is large and growing larger, and we believe that some manufacturers are still failing to reach it. The fact that Mastertronic have sold well over a half a million games in what is supposed to be the quiet season demonstrates this".

Cottagers' viewpoint

A DRAMATIC development in graphics technique has been claimed in a recently launched game for the 48K Spectrum by new company Sterling Software.

Country Cottages, its first game for the Sinclair machine, uses landscape creation — a technique similar to that used in the Beyond **Lords of Midnight,** in which over 30,000 views of objects and places can be drawn using algorithms within the program.

Sterling, an off-shoot of reference book publisher Sterling Publications, claims that Country Cottages can draw infinite views of the surroundings with which the players are faced in this two-player strategy game.

After that the plot is much more mundane, being somewhat like *Monopoly* in which the purchase and sale of properties is important.

The package of releases for Christmas also includes the first in a series of adventure games featuring ace secret spy the Ice Man, in a plot called **Assignment East Berlin.** The next in the series is already at the planning stage and is called **Assignment Hong Kong.**

Willy misses Christmas rush

THOSE hoping that the sequel to Jet Set Willy will be released before Christmas are in for a disappointment as Software Projects does not intend to launch the game until the spring of 1985.

Matthew Smith and company director Alan Maton are still thinking about what should go into the game. Smith has some very definite ideas but only a few of them are printable. "Somewhere in the game we are going to have an Alice in Wonderland character". He says that there are some problems with that idea. "You can show a voluminous skirt in 16×16 pixels very well but you can't have any features".

The other reason for the delay is that Smith wants to include a hardware based add-on which will be of use to Spectrum owners even when not playing the game.

Meanwhile Software Projects have launched a game called **Lode Runner,** which is a levels and ladders game in which the player has to collect blocks from a screen which is re-definable.

HURG record winner



TOM DAVIES, winner of the Melbourne House HURG competition for the Spectrum is presented with a cheque for £2,500 by John Gilbert, deputy editor of *Sinclair User.*

The winning entry, written using the HURG games designer, features a character called Tim Drum who has to produce a record soundtrack using notes which he has created.

The idea, created by Davies, is to be sold by Melbourne House.

more news on page 16

Telecom software

BRITISH TELECOM has launched its own software house, Firebird, and its range of products includes six budget games for the Spectrum.

The company does not employ in-house programmers but buys software on a royalty basis.

The initial titles for the Spectrum include two arcade games, an arcade adventure and a war strategy program. The difference between Firebird's products and that of rival software houses is in its packaging. Firebird puts screen shots of games on the cassette insert so that potential customers will know what they are getting. Richard Hooper, Chief Executive of BT's Value Added Systems and Services says: "You can now judge a game by its cover. In a market where quality and prices tend to be variable and complaints of misrepresentation frequent, Firebird is setting new standards."

The first titles cost £2.50 each and Firebird sees that as excellent value for money. "Despite the pocket money price Firebird games will offer the same quality as some products costing twice as much. Firebird is committed to the home computer market and will deal only through established distributors."

Sinclair profits

THE YEARLY pre-tax profits for Sinclair Research are significantly less than expected.

For 1983-84 profits were £14.28 million whereas the previous financial year they were £14.03m. Company turnover, however, rose by 42 percent from £54.53 million to £77.69 million.

Sir Clive Sinclair, writing in the annual company report says that the low profit figure was largely due to the launch of major products such as the QL and the pocket television which 'added greatly to costs in the year but little to sales'.

He did have hope for the coming year. "Our Spectrum computer continues to gain in sales. Pocket television production is increasing and we hope to expand sales abroad next calendar year.

"Export sales have increased steadily and there has been rapid growth in the home market. Export sales are expected to increase as a percentage of total sales".

Looking into the future, something that Sir Clive is always doing, he stressed the company's 'strong technical leadership which we expect to enhance now that our advanced research laboratory, MetaLab, is established'.





Sir Clive Sinclair was to be seen clutching the QL for the inevitable photographs at the launch, held at Claridges, of two new guides for QL software, QL Quill and QL Easel.

The books written by Alison and Clare Spottiswoode, and Francesca Simon, are their first venture under their new company Blueprint.

The books are aimed at the first time use who has no experience of word processing and business graphics. Both books will sell at £7.95 and are published by Century Communications.

Computers save world

A COMPUTER capable of creative thought is the incredible claim put forward in a new book from Viking Press, a division of Penguin Books.

The Creative Computer, by Donald Michie and Rory Johnston, shows how it is possible for computers to create new knowledge in order to solve the major problems facing humanity such as disease, economic stagnation and international strife.

The authors' findings are based on a major new discovery which is only now emerging from the world's most advanced computer laboratories. It is based on the new technology of expert systems, computers that contain accumulated knowledge upon which they can make judgements and the ability of computers not just to make predictions but also to show reasons for doing so.

Issues within the book involve philosophy, religion, ethics, the arts and politics giving it a wide appeal to readers outside the computer field. It costs £12.95 and can be obtained from Viking Press, 536 King's Road, London SW10 0UH.

Second-hand magazine

SELLING and buying micros or software is no longer a problem according to *Micro Mart,* a new fortnightly newspaper published by ECC Publications, which consists of advertisements and looks like a computer version of *Exchange and Mart.*

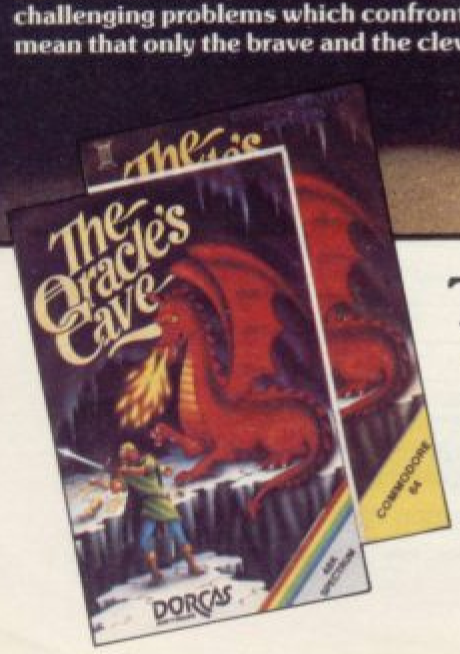
It is aimed at the two and a half million users of home computers, a third of whom say that they will upgrade to new machines within the next twelve months.

Micro Mart costs 35 pence and carries classified and display advertising for private and business sales. Its first print run was 70,000 copies and was backed by a £100,000 television, radio and press advertising campaign.

Barry Hazel, assistant managing director of ECC, explains how the company became concerned with the need to fill the niche in the magazine market. "Through our existing involvement in publishing in the micro business, we were very aware of the increasingly high turnover of products amongst customers and suspected that the market was now big enough to justify — and support — a magazine devoted entirely to buying and selling computers and computer-related products.

"Our slogan for Micro Mart is 'the buy-word for selling computers' and all the signs are that it has a very healthy future."





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A change of cursors

ALTHOUGH I AM an ardent follower of Andrew Hewson's Helpline articles his reply to Peter Groenewald is not entirely correct. It is possible to force a cursor change, and such changes can prove quite useful.

System Variable MODE (23617) can be POKEd with 1 to force a cursor change to E mode or 2 to produce G mode. The latter is of little practical value as it is just as convenient to use CAPS SHIFT 8 as G mode stays until cancelled.

Not so with E mode. To enter user-defined graphics bytes in BINary is helpful but tedious as it is necessary to go into E mode to produce the BIN token for each byte. This short routine will force an E cursor so only the B key need be pressed to generate the BIN:

```
1000 INPUT "How many udgs
(starting at A)?";n: FOR f=USR
"a" TO USR "a"+8*n-1:POKE
23617,1: INPUT i: POKE f,i:
NEXT f
```

Changing between L and C modes is quite easy under software control. The System Variable which goes under the cryptic name of MORE FLAGS (23658) is the key. Bit 3 holds 0 for L mode or 1 for C mode so POKEing with 8 (BIN 00001000) forces a C cursor. This can be very useful when checking responses in programs. For example, the rather clumsy line:

```
1000 PRINT "Press Y to play
again": PAUSE 0: IF
INKEY$="y" OR INKEY$="Y"
OR INKEY$=" AND " OR
INKEY$="STR$ " OR
INKEY$= " " THEN RUN
```

necessary to check all the possible responses to key Y, can be replaced by:

```
1000 PRINT "Press Y to play
again": POKE 23658,8: PAUSE 0:
IF INKEY$="Y" THEN RUN
```

as, with CAPS LOCK set the response must be "Y". Of course the user could cancel the C mode before answering but this would have to be a conscious act of sabotage and such people deserve all the crashes they get. POKE 23658,0 will reset to the L cursor.

Clyde Bish,
Clyst St. Mary,
Devon.

You better believe it

I HAVE REACHED level 79 on **3D Cosmic Ghost Cockerel,** for the ZX-Quantum-86. When you bang the rats on the head, I have found you score no points at all, unless you have fitted a dk'tronics 40 key full-moving keyboard with separate numeric keypad.

Please tell me why.

Simon Godfrey,
Chesterfield,
Derbyshire.

● *Your problem is to do with the non-standard 287-pin DIN connection. To correct the fault, solder a Megahype 3-way RS232 Q-drive Interface to the ninth pin. That will of course invalidate your guarantee.*

Please, more adventures

I AM A FAN of *Dungeons and Dragons* so my only complaint is there is not enough on adventure games.

Software Directory is a great idea. Before I buy a game I always look to see how many marks it got. Other than the one complaint, your magazine is number one. Keep up the good work *Sinclair User.*

Alan Jones,
Wrexham,
Clwyd.

Compiler in reverse?

IS THERE a program available on the market which will change machine code into Basic. Also, are you able to advise me of the code which will take you onto any part of **Jet Set Willy?**

Richard Burnett,
Beverley,
North Humberside.

● *There is no program which can translate machine code into Basic. Indeed, such a program would be impossible to write because of the nature of machine code, although it is possible to compile Basic into code. Even if there were, what would anybody want one for?*

The relevant POKE for Jet Set Willy, along with all sorts of other wacky routines for the game, can be found in the August issue of Sinclair User.

Turkey is no chicken

I WOULD LIKE to comment on your review of **River Rescue** by Creative Sparks. I think the game is worth more than a Gilbert Factor of three since in later levels planes, bridges and mines come into play which makes the game much more exciting to play.

Colin Campbell,
Cardiff.

Self-starter programming

CAN YOU tell me how to get programs to auto-run on the ZX-81?

I would like to add that everyone seems to complain about ZX-81s not working. I have had mine for almost two years and I have not had one complaint. That applies to my friends who own ZX-81s as well.

Mark Homans,
Leamington Spa.

● *To make your ZX-81 programs auto-run, incorporate the usual SAVE command within the program, e.g. 900 SAVE "name". Type RUN 900, start the tape recorder and then press NEWLINE.*

Venetian connection

I AM AN ITALIAN boy and I would like to exchange my programs with anybody reading my letter. Send your list to: Scarpa Mauro, Via Giorgione 9, 30038 Spinea (VE), Italy, and I will answer you.

Scarpa Mauro,
Venice,
Italy.

Suffering Sabreman

I AM VERY impressed with **Sabre Wulf** from Ultimate but have found two problems which I cannot understand. Firstly there are the native warriors, who get on my nerves by being indestructible. I am always getting killed by them, and it puts me off.

Secondly, I have seen a map of the Sabre Wulf jungle and I cannot figure out why there are tracks which are cut off from the others. Is there any way to get into them as there are often totem poles and rings and diamonds there? I thought there might be a secret passage to get into them but unfortunately I cannot seem to find one.

Adrian Ford,
Sheffield.

Daley in defeat

DECATHLON, by Ocean, is a brilliant game and has excellent graphics, but is almost impossible to load. I have had nothing but problems and I am sure I am not the only one. You need at least half an hour to load it, and then it is not guaranteed to work. Ocean should improve the loading.

By saying this I would not want to discourage anyone from buying it. When it works, it is the best game I have seen for the Spectrum.

Peter Davis,
Cinderford,
Gloucestershire.

more letters on page 24

Gilbert is innocent

STEVEN ROBBIE, in the September issue, complained that **Halls of the Things** was not worth a Gilbert Factor of 9, and that you needed six hands to play it.

I think the graphics are very good and smooth moving. The point of having so many commands and keys is that you pick the ones you think are the best to use. You do not use all of them. If you get tangled up with the keys, you can press '1', which pauses the game.

Also Steven thought that **Maziacs** was not worth a Gilbert Factor of 8. Has Steven tried level four a few times? If you complete that, it is probably because you got an easier maze — each one is different.

To top all of that, he complained that John Gilbert should be sacked. Do not worry, Gilbert, someone still supports you.

Suzanne Madison,
Gosforth,
Newcastle upon Tyne.

Never forget the ZX-81

I AM WRITING to say how disappointed I am with ZX-81 Software Scene. This usually features only two games. I then looked at Spectrum Software Scene, which contained a satisfying eight games. In future editions could you please review a few more games pleased.

I also noticed in the September edition a small mistake in the program **Caves of Doom** for the ZX-81. In line 10 it reads "10 FOR X=16514 TO 16560". It should read "10 FOR X=16514 TO 16559".

Robert Tempest,
Castle Bromwich,
Birmingham.

● *The amount of space devoted to ZX-81 software reviews is a direct reflection of the number of games we receive compared to Spectrum software. We would dearly like to review more, but can only write about what is being produced by the industry.*

Theodora's fan club

I'M MISSING Theodora Wood's comments on educational programs. Why?

Why also are there not more educational programs for the Spectrum? It seems that the BBC can make them. That degrades the Spectrum almost to a toy.

Rosa Wieloely,
Bruges,
Belgium.

● *Theo's many fans will be delighted to know she is still alive and kicking. In recent months we have not received enough educational software to justify a full article, but will continue to review such programs in the Software Scene section of the magazine. There are certainly no plans for dropping the education content.*

Subtle tip for bikers

I RECENTLY BOUGHT **Full Throttle** by Micromega. It is an excellent game but I seem to have found a bug in it. It is useful if you are in the tail of the field.

At the end of the last lap of the race when the word FINISH flashes on the screen, stop your bike just in front of the finishing line. Wait until the first of the other bikers appears on the screen, then accelerate over the line.

David Morgan,
Handsworth Wood,
Birmingham.

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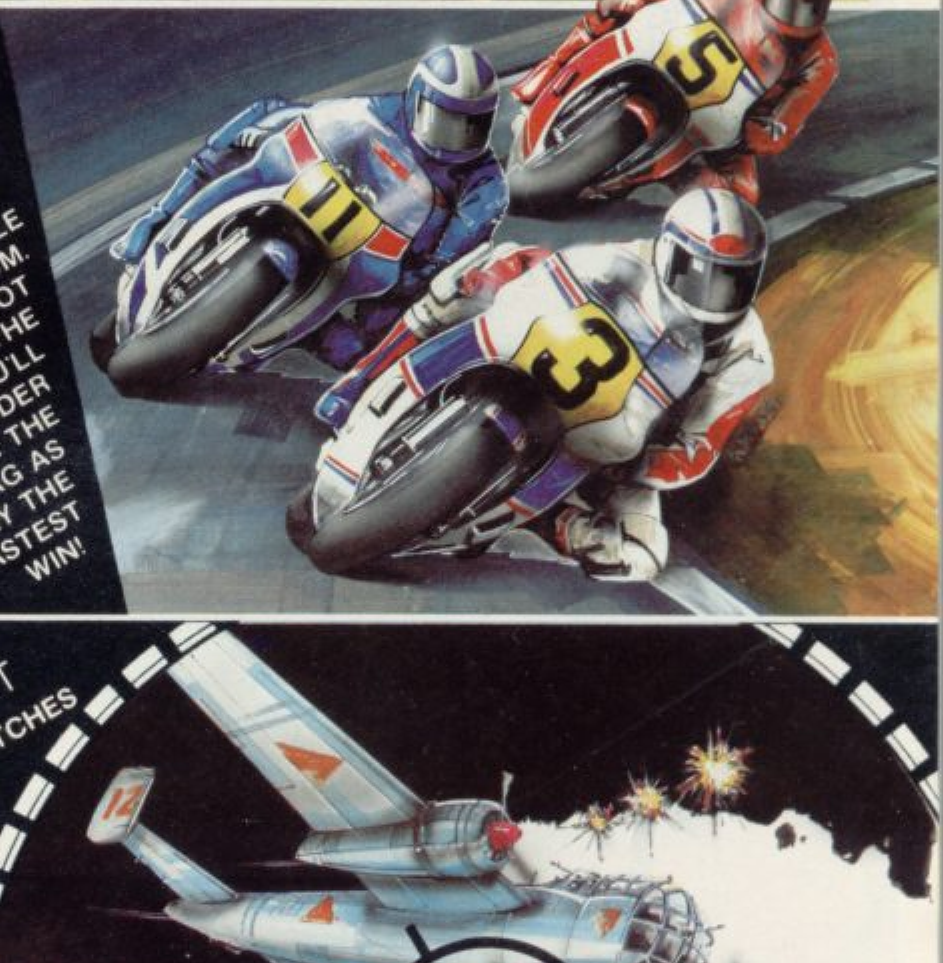
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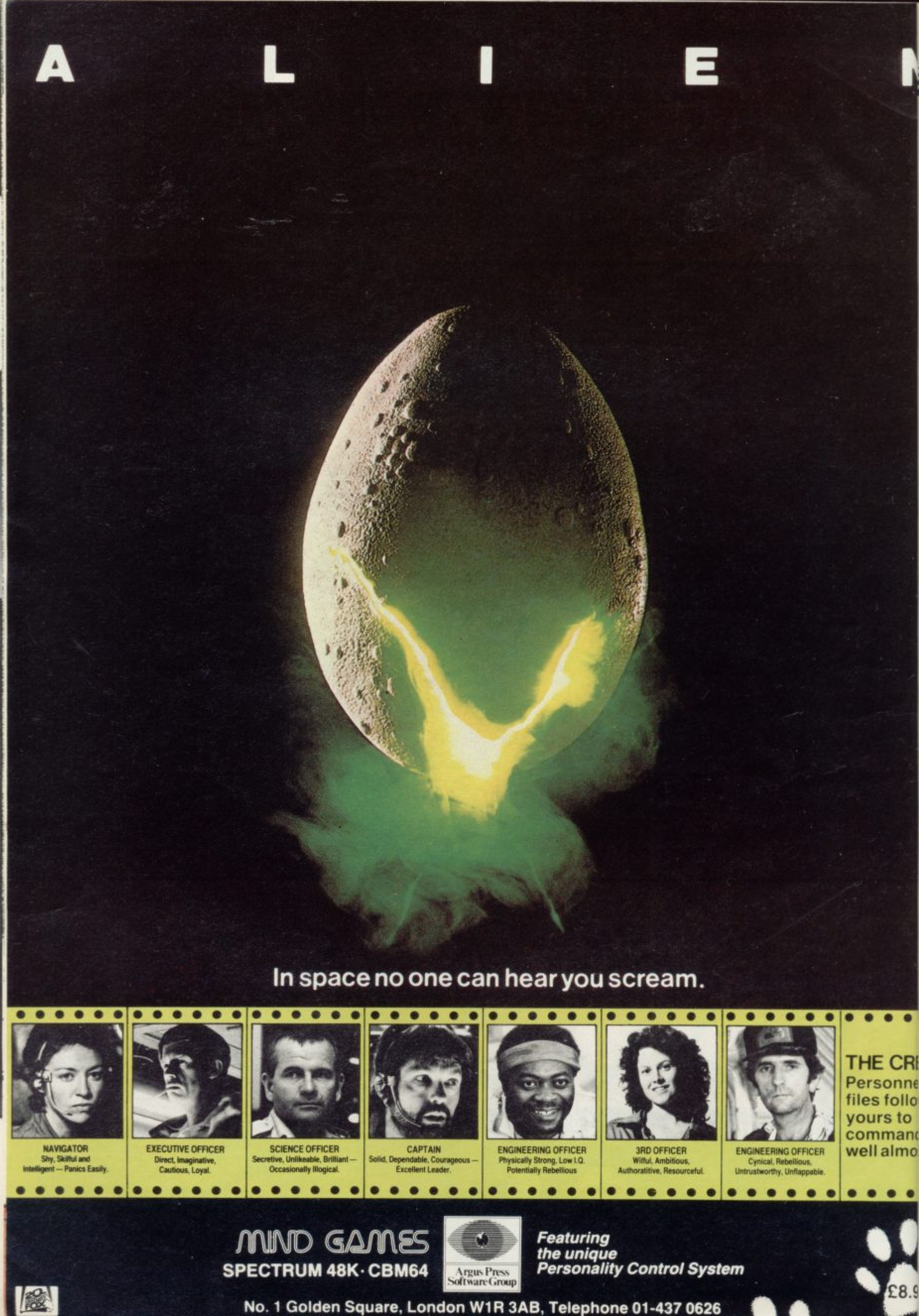
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Trouble in threes

TWO GRAPHICS adventures and a text-only adventure on one tape for the ZX-81 must represent good value of a sort, especially at only £3.20. The latest collection from Gavin Barker provides a reasonable introduction to adventure games, but is unlikely to fire the imagination of seasoned players.

The Challenge pits you against an evil knight in a mediaeval setting. You must equip yourself with the necessary weapons and armour, and seek out the challenger in his fastness.

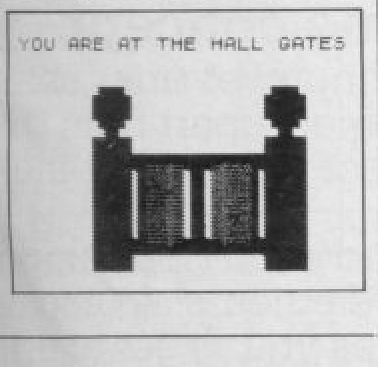
The graphics are simple block pictures of castles, bridges, temples and the like, and the text is brief and occasionally badly spelt. The route to success is intricate, although there are a number

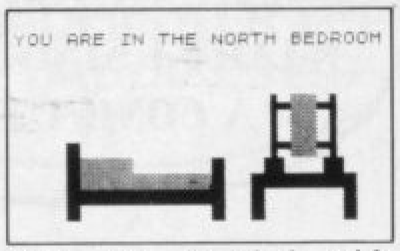


of ways of achieving your goal, and all commands are drawn from a fairly limited vocabulary using standard two or three word inputs.

With over thirty-five locations and plenty of juggling with objects to be done — you are only allowed five at a time — it will take some time to work out your strategy.

Haunted House is written along similar lines, but in this case the graphics are rather better although the adventure itself is slightly less complex. Additionally there is a fight routine which en-





ables you to deal with Ghosts, Mad Axemen, or a retired hangman. What Albert Pierrepoint is doing in an adventure game is not clear, however. You are also allowed to bribe the monsters if you have enough gold.

Both games include an interesting feature whereby if an object is already at a location then you cannot drop anything else there. That makes it all the more difficult to organise what you are carrying effectively, as you may have to backtrack a long way in order to find an empty location in order to drop such bulky and unwanted objects as a used match. It may not be very realistic but at least it increases the complexity of the game.

The third adventure is a text-only offering called **The Black Staff.** The game is rather more humorous than the other two, and is set in the standard world of wizards and dragons. Your job is to regain possession of the staff of the title. The ancient piece of wood used to belong to an old wizard but was stolen by some dwarfs. The dwarfs were turned to stone through neglecting the daily care of the staff and you are admonished at the start of the program to watch out or the same could happen to you.

The vocabulary for the adventure is rather wider than that of the other two, and some of the puzzles are more complicated, but by and large the game is of only moderate difficulty and should not take too long to solve.

Taking each on its merits, none of the adventures offers the kind of excitement of, for example, those from Artic or Carnell, but given that they are presented as a package at a reasonably low price, they do represent value for money.

The only real pity is that they were not written in machine-code, which would allow space for a considerably more sophisticated text interpreter and prevent the need for doing everything in FAST mode, thus causing the screen to flicker unpleasantly every time a key is pressed. That does not cause problems in the third adventure, but impairs the quality of the graphics in the first two, which would otherwise be much more pleasing.

Chris Bourne

ADVENTURE
Memory: **16K**
Price: **£3.20**
Gilbert Factor: **6**

Two digit exercise

SOME people find coping with hex-code and least significant bytes as easy as being sick on Watney's, but for every one of those hyperactive minds there are at least two humdrum souls who never even make it past binary numbers.

Binary Brains from Pooter aims to alleviate their misery by providing a primer in the theory of binary numbers, taking in octal and hexadecimal along the way. Once you have struggled through the primer, side two of the tape contains a mastermind-type game to see if you absorbed any of the material.

The information in the primer is accompanied by questions. The first set of questions is very boring, as it follows a fixed pattern. That is no doubt deliberate, in order to drum home the basic patterns formed by numbers, but may convince the less sensitive that number bases are as dull as they always thought. After the first round, the second asks more random questions.

The game asks you to guess at a number by entering a decimal number. The computer converts your guess into binary and compares it with its own number, and then tells you which digits you got correct. In order to win, and avoid the humiliating nickname of 'Decimal Brain' you will have to do a fair few decimal-binary and binary-decimal conversions in your head.

There is an element of fun in the program, but the first part is stodgy and the game is either trivial or impossible, depending on whether you understood the primer or not. There has to be a more exciting and painless way of getting across the necessary information. Like reading a simple book, perhaps?

Available from Pooter Games, 24 Parsloes Avenue, Dagenham, Essex.

Chris Bourne

BINARY BRAINS
Memory: **16K**
Price: **£1.85**
Gilbert Factor: **5**



First, a question.

Who do you think are the world's most avid consumers of microcomputers?

The ingenious Japanese? The fashionable French? The acquisitive Americans?

Believe it or not, it's we British who own more micros per person than any other nation on earth.

Yet, despite its amazing impact, the microcomputer has only just begun to scratch at the surface of our lives. Without doubt, the best is yet to come.

Use and Abuse.

In several recent surveys, some astonishing facts about micro use and abuse were revealed.

It was discovered that the micro is hopelessly under-utilised. If you're already a micro owner, your own experience may well confirm this unhappy state of affairs.

Brainpower. A source of knowledge.

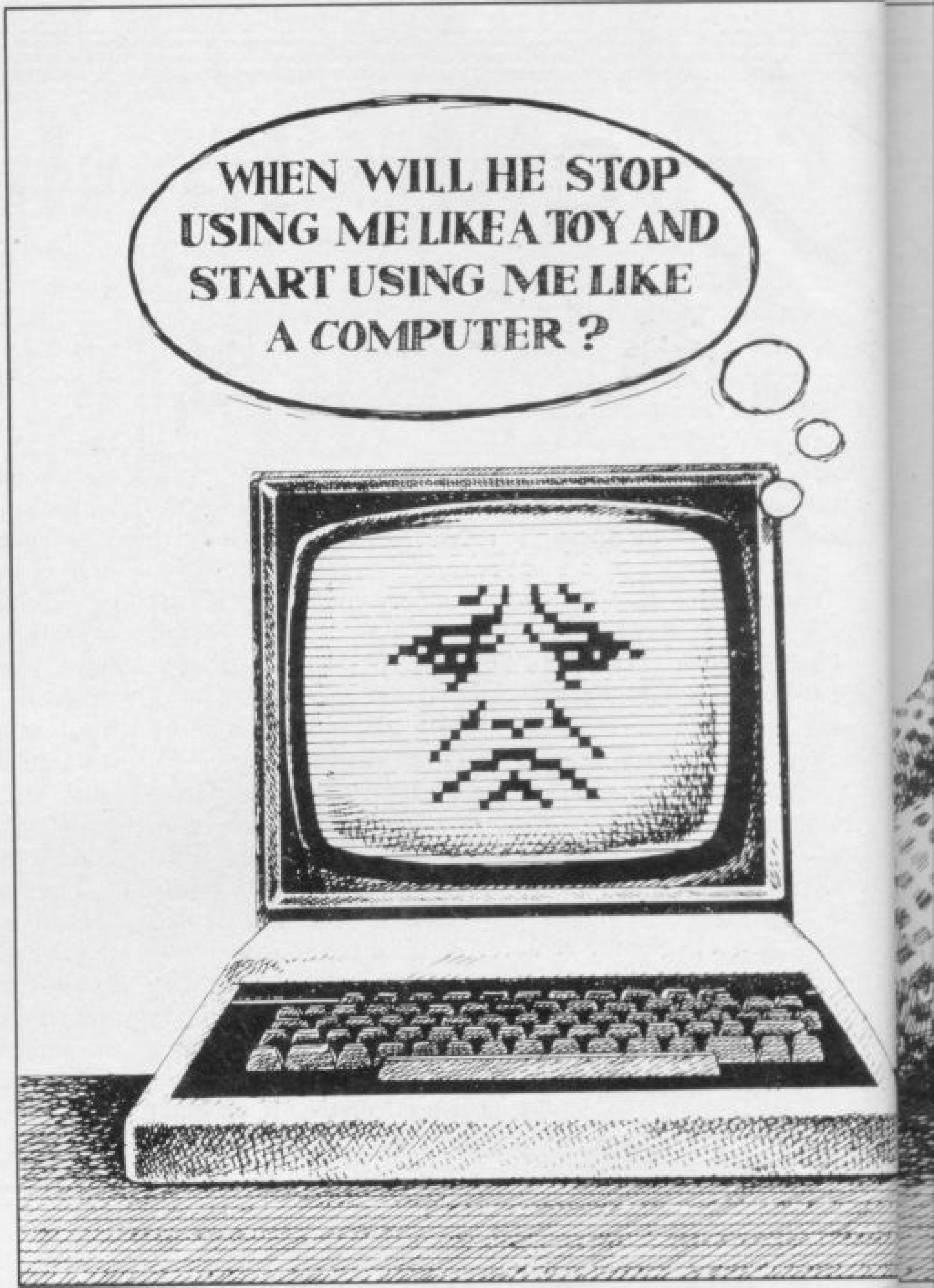
For thousands of years, the key to self improvement has been in the hands of the written word. Now, thanks to the Brainpower range, it's very much in the hands of the micro.

As the Brainpower range demonstrates, this does not require prior knowledge of micros, or how they work.

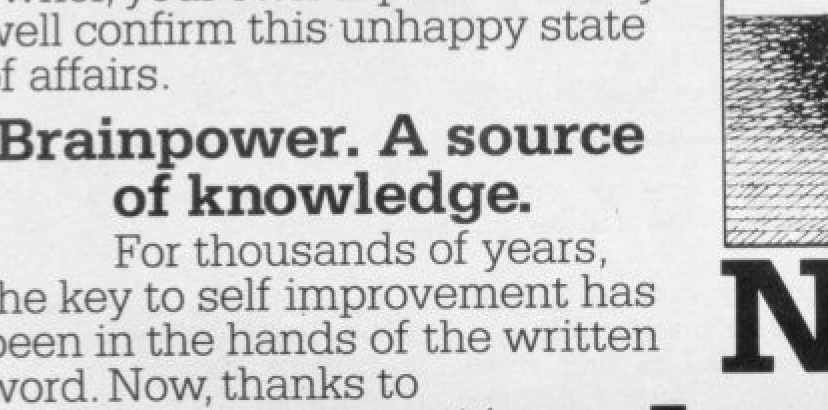
The Brainpower concept has been devised as *integrated* applications and educational software. And its aim is to stretch both your mind and your imagination.

It offers a unique way to realise your own full potential and that of your micro. In a way you could never hope to achieve from the printed word alone.

In this respect, the Brainpower range stands on its own.



Now you and
bring out the b

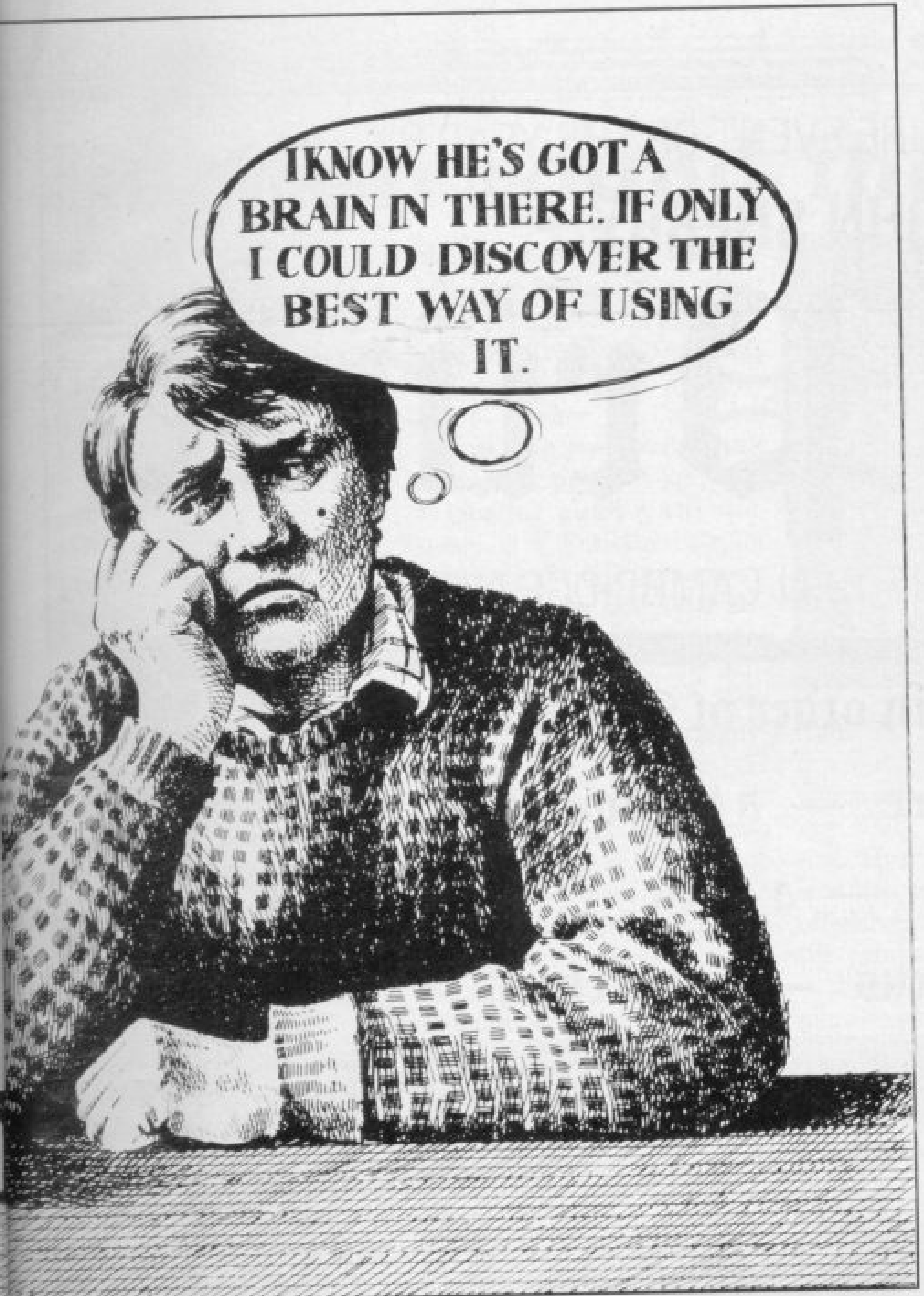


Each Brainpower title provides a unique three part package: an applications program; a teaching program and an illustrated manual and interactive tutorial – integrated applications and educational software

A unique concept.

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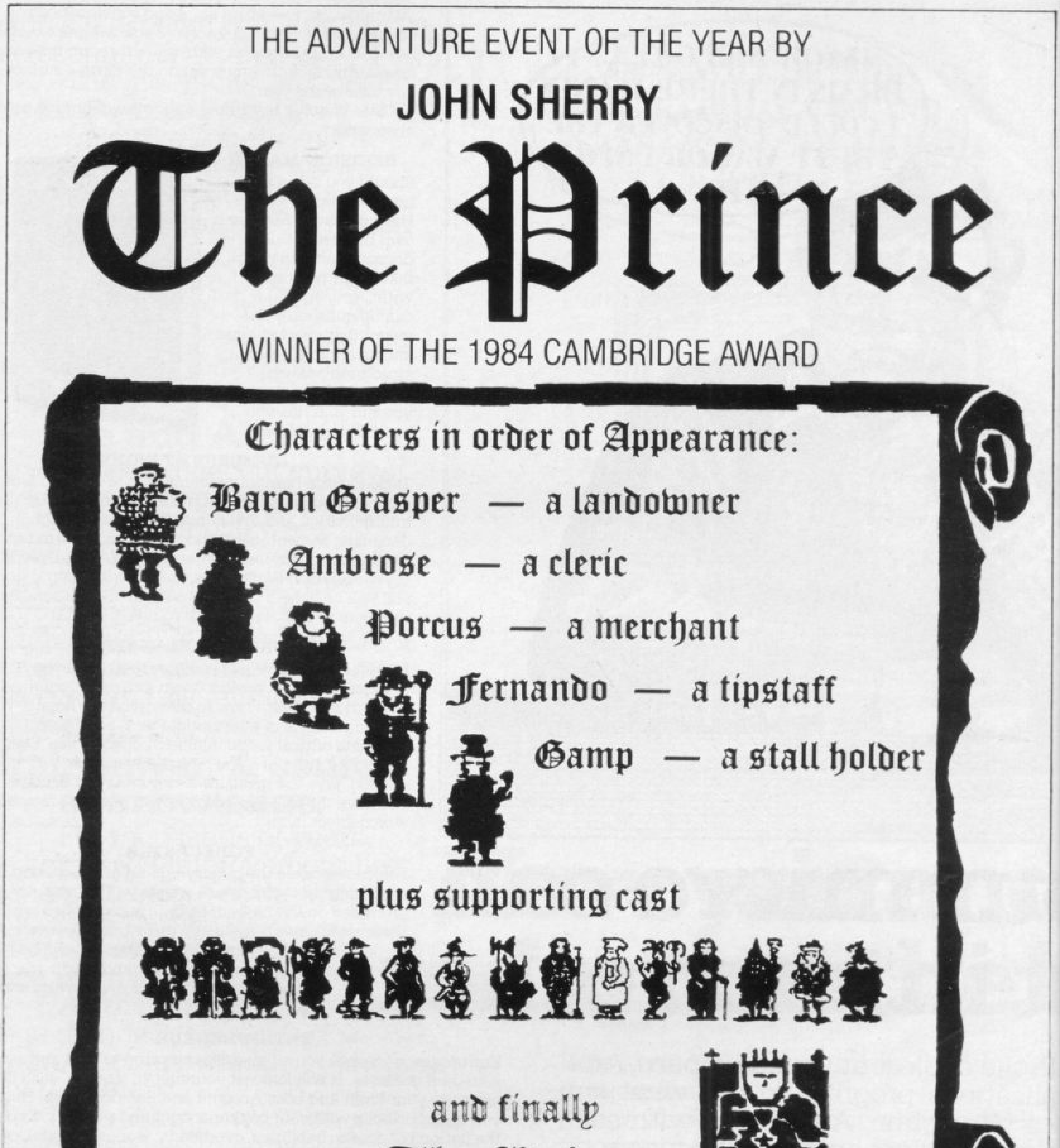
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Porcus — a merchant
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Rubbish round the world

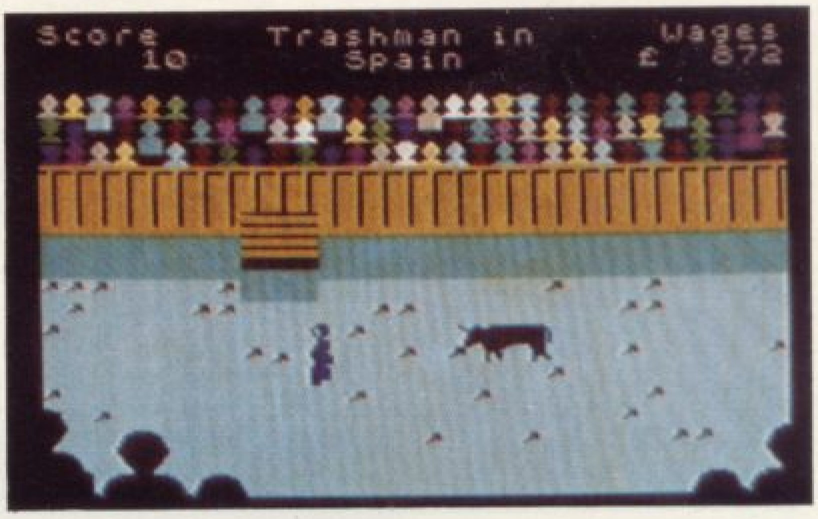
OBSESSED with rubbish after a lifetime of emptying the bins of suburbia, Trashman, that Napoleon of garbage, is off to foreign parts to teach the world a thing or two about litter.

Travel With Trashman sets our hero the mission of flying to various famous tourist spots to deal with the rubbish problem. They include collecting roses from a Spanish bullring, coconuts from a Samoan beach, and secret papers fluttering from the windows of the KGB offices on the Red Square.

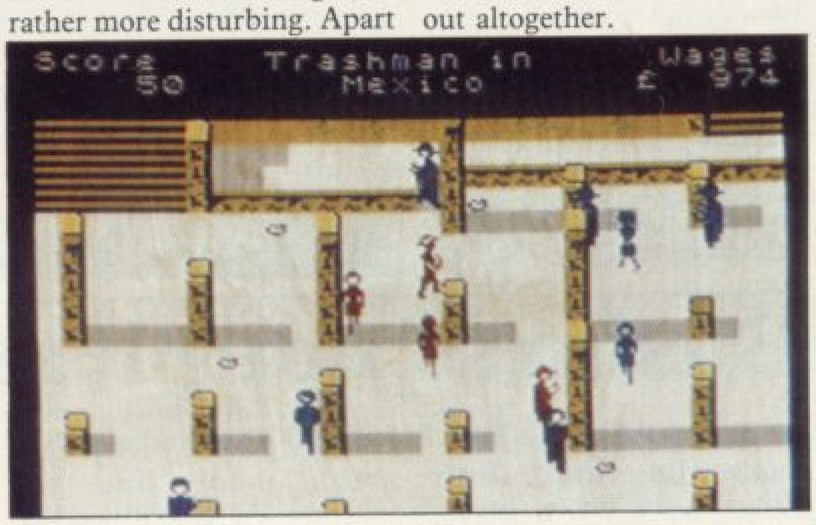
Trashman was greatly admired for its superlative graphics, but unfortunately the sequel does not match the earlier program in that respect. It is true that the thirteen screens are all completely different, whereas Trashman was built around various streets using the same few houses in different configurations, but there are too many occasions where colours flicker and change messily. Were that not the case, the graphics would be excellent, but as it is you are forced to conclude that New Generation has overreached itself slightly in designing screens too complex.

That does not, however, make the game any the less addictive, and on that score Travel with Trashman is a worthy successor to the original. You start with a fixed sum of money, with which to buy a ticket to a variety of destinations. The money is replenished according to your success in clearing up the rubbish at each location. That allows the player to try at least three screens immediately, even though unable to complete them. It also requires some tactical thinking from the more experienced player, in order to travel as cheaply as possible while still visiting all the locations.

As ever, New Generation has included its own style of humour in the game, not only with the visual gags about what constitutes foreign rubbish, but also with comments on the screen. The comments occur when Trashman bumps into the locals while attempting to do his job, such as tangling with French waitresses at a Parisian cafe, or upsetting the efficient service at the Munich beer festival.



Most of the humour is based on excruciating language jokes, such as 'Gettenze artz a vay' in Germany. By and large, the jokes are inoffensive, although more likely to produce groans than laughs. However, the scene in Benares, where Trashman has to collect the sandals of the faithful as they immerse themselves in the Ganges, is rather more disturbing. Apart from the concept of making fun out of religious beliefs, which also occurs at the Wailing Wall in Jerusalem, the line 'Hurry curry Trashman' is at best puerile and at worst offensive. If that was the best the company could think of, it should have left the screen out altogether.



If you are impervious to that sort of humour, and do not expect miracles of graphics programming, you will find the game great fun to play and highly addictive. There is a considerable range of difficulty in the various screens, and although the mechanics of picking up litter remain the same, you will have to change your tactics to suit each particular situation.

It is a pity, therefore, that New Generation could not have taken more care with the graphics and humour.

Chris Bourne

TRAVEL WITH TRASHMAN
Memory: **48K**
Price: **£5.95**
Joystick: **Kempston, Sinclair, Cursor**
Gilbert Factor: **7**

Buzz on the grapevine

BUZZ OFF from Electric Software is a fruity little program starring Bertie the Bee whose longing for sweet ripe strawberries and other assorted fruit gets him into a lot of trouble. He enters the Enchanted Orchard where his heart's desire hangs temptingly. Little does he know that a large spider is waiting for a wee bite too.

You must manoeuvre the bee around the screen collecting pieces of fruit as they appear. Once a piece has been eaten a portion of spider's web takes its place. If Bertie touches any part of the web down comes the nasty arachnid to collect his own lunch.

There are ten levels. In the first no web segments are visible but thereafter the spider will have spun bits of web to hinder Bertie in his task. As Bertie only moves in a straight line — bees do don't they? — getting round the screen is very difficult and the game requires large doses of concentration and care. The graphics are well-drawn, though necessarily limited to the bee, the spider and the fruit. The spider is distinctly menacing though Bertie looks rather bumbly.

This is the sort of arcade game you'll either adore or detest. Bertie's job is hard and there is no zapping or violence on the player's side. Skill and judgement are needed for success and the game concept is limited to the one task. **Buzz Off** is a good representative of this type of fruit game but runs the risk of repetition after a while.

Richard Price

more software on page 34

BUZZ OFF
Memory: **48K**
Price: **£4.95**
Joystick: **Kempston, Sinclair**
Gilbert Factor: **5**

A mouse with a mission

PENFOLD would certainly have approved of his rodent pal's adventures in **Dangermouse in Double Trouble,** from Creative Sparks.

It is a simple tale of terror in which the evil Baron Greenback, the turtle who is always trying to land Danger and Penfold in the soup, decides to create an Android Dangermouse. There are three episodes, reminiscent of the television series, in which you have to get the terrible twosome through to the computerised robot factory.

The first screen shows Dangermouse in his aerocar under attack from robots which must be shot by musical notes. As each is shot the score increases and the display showing you and Greenback in a tug of war changes so that you are winning the struggle. Every robot which hits you makes the turtle give an extra pull, which takes you further from your goal.

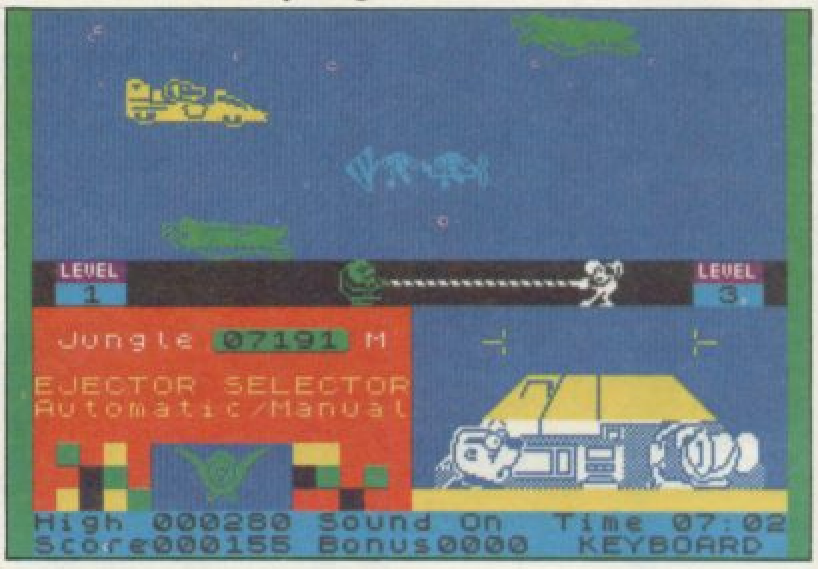
The jungle scenario of screen two, in which you have to jump on a crocodile and avoid the big cats and monkeys, leads to the final confrontation. Here Dangermouse must extinguish all the lights in the power matrix to destroy his double while avoiding Penfold who is being chased by Nero.

The game should keep any ageing youngster entertained for hours and the only danger is that the real youngsters will not get a look-in.

Dangermouse in Double Trouble would make a great Christmas present. We will certainly be asking Santa for future adventures starring the intrepid hero.

John Gilbert

DANGERMOUSE IN DOUBLE TROUBLE
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston, ZX, Protek, Fuller**
Gilbert Factor: **8**



City of the undead

MOVING in the same direction as the film industry, Quicksilva has made the horror quantum leap from giant ants to zombies. Following the trail blazed by **3D Ant Attack,** the company has now released **Zombie Zombie,** using the same softsolid technique which popularised the former.

Softsolid is a means by which a true 3D perspective is built up using 'solid' cubes to form structures, behind which you or the monsters lurk. The landscape is a ruined city, many times larger than the screen, which may be viewed from any of four directions, thus enabling you to see behind the walls.

You have a small helicopter, casting the now fashionable shadow when aloft, which can pick up and redistribute the bricks of the city. That enables you to cut off or channel the zombies to a suitable killing ground.

Destroying zombies is much more difficult than killing ants. The only apparent way of doing it is to lure a zombie up a set of steps and over a precipice. You are capable of surviving the drop, but the zombie goes splat and leaves a small red puddle.

The game is less playable than 3D Ant Attack, despite the welcome provision of joystick options. Whereas the ants used to swarm in large numbers around you if you stood still, the zombies are difficult to find. That, coupled with the enormous difficulty in destroying them, makes it more fun to potter around designing buildings with the helicopter rather than get on with the game.

Chris Bourne

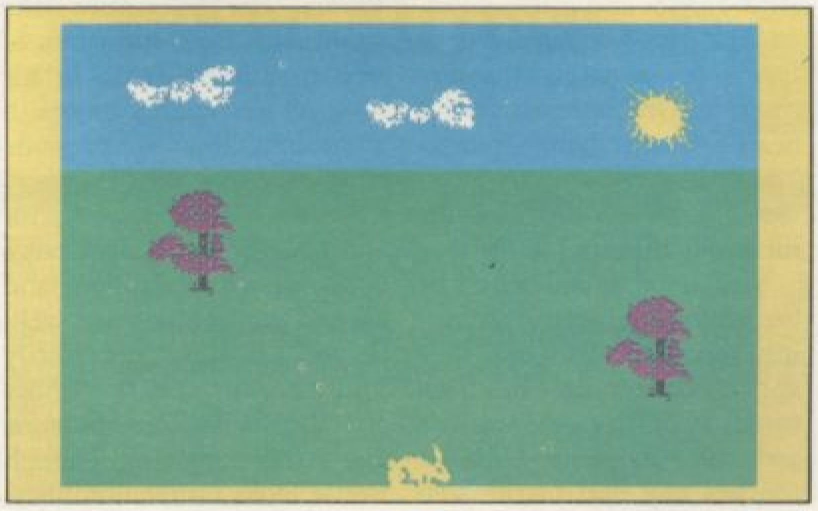
ZOMBIE ZOMBIE
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston, Sinclair, Cursor**
Gilbert Factor: **7**

Business not pleasure

THE MOST SENSIBLE motive for buying **Hareraiser** is the sincere need to get rich.

The sole aim of the program is the discovery of a Golden Hare somewhere in the game landscape. Do not assume you are getting a fancy version of Kit Williams' *Masquerade* with complex graphics and a vast expansive plot.

The 'game' consists of a number of lacklustre, stark and simple screens depicting the countryside, with an occasional hare bouncing around and then disappearing. At the bottom of each of those thoroughly dull pictures appears an obscure phrase which may or may not help you to find the hare — or your £30,000 in lieu.



If you decide to persist with the puzzle you will still have to buy a second program before completing it.

The casette insert provides details on how to enter. The only instructions on screen tell you to follow the hare with cursor keys. There seems to be no evidence of the richness of the original book.

Quite honestly, it is rather difficult to understand why this program was produced at all, though cynics may draw their own conclusions. Me, I'm going to zap a few aliens instead.

Richard Price

HARERAISER
Memory: **48K**
Price: **£8.95**
Gilbert Factor: **3**

Whirlybird warfare

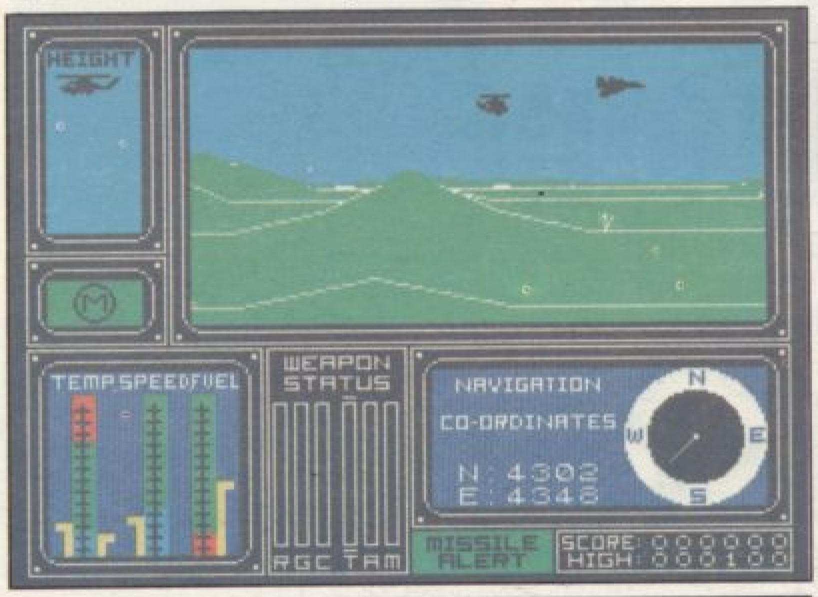
YOU MAY HAVE experienced any number of flight simulation programs in which you take a single-seater bi-plane up into the wild blue yonder. Now for something completely different.

Combat Lynx, from Durrell, is not as tame as the programs from Psion or Protek. You can hover, dip and rise in a battle-worthy helicopter, bombing the enemy aircraft gliding like sitting ducks into the range-finder and which can be despatched quickly with an air-to-air missile or rapid fire from one of your machine guns.

Despite what you might be led to believe the game is about defence and not offence. You must defend three of six ground bases, making sure that the enemy does not get to them on foot or in the air.

Once you have equipped your machine with something from the choice of missiles and guns, using the educational schematic plans of the helicopter, you can start the game and launch into a combat zone represented in 3D. The helicopter representation is only adequate but the shifting hills and dales over which it flies give the necessary realism to what is a relatively true-to-life battle simulation.

The game is too much of a simulation. Beginners will find it difficult to get anything within their sights and flying the helicopter without an enemy to hound you will prove that Combat Lynx is for the dedicated performer who likes to impress friends with displays of dexterity at the keyboard. Arcade gamers might find it tedious because of the lack of immediate excitement. If, however, you are a level-headed player who likes to take time in developing skills Combat Lynx will pay off. *John Gilbert*



COMBAT LYNX
Memory: **48K**
Price: **£8.95**
Joystick: **Any programmable**
Gilbert Factor: **8**

Talking of Tinker Bell

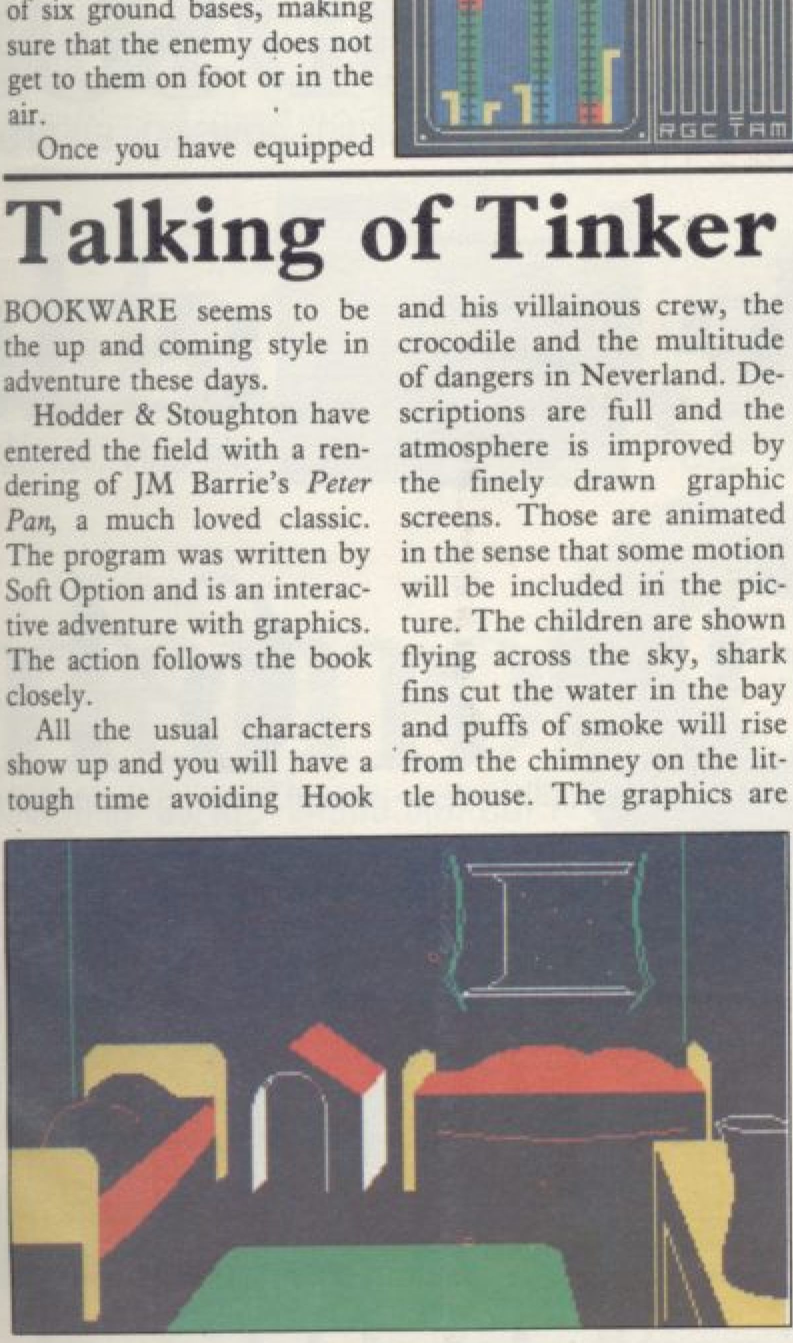
BOOKWARE seems to be the up and coming style in adventure these days.

Hodder & Stoughton have entered the field with a rendering of JM Barrie's *Peter Pan,* a much loved classic. The program was written by Soft Option and is an interactive adventure with graphics. The action follows the book closely.

All the usual characters show up and you will have a tough time avoiding Hook and his villainous crew, the crocodile and the multitude of dangers in Neverland. Descriptions are full and the atmosphere is improved by the finely drawn graphic screens. Those are animated in the sense that some motion will be included in the picture. The children are shown flying across the sky, shark fins cut the water in the bay and puffs of smoke will rise from the chimney on the little house. The graphics are very attractive but do take a little time to draw. If you are impatient the pictures can be turned off.

Peter Pan has most of the standard adventure features though it is not too good at understanding abbreviations. The characters move quickly around the landscape and it can be quite an effort to keep up with some of them. The intrepreter is not as obviously sophisticated as The Hobbit's.

Nevertheless, the game is well produced and should have a strong appeal to fans of the boy wonder and his band of lost adventurers. It is also nice to know that Barrie's royalties will be passed onto Great Ormond Street children's hospital. Peter Pan should make a good Christmas present. *Richard Price*



PETER PAN
Memory: **48K**
Price: **£9.95**
Gilbert Factor: **6**

Test for motorists

STOP. Taking your driving test? Now there is a program to test your ability and help you learn.

Highway Code is made up of five sections each containing approximately 30 questions on motorways, signs giving positive orders, warning signs, general signs and negative order signs. Each question has multi-choice answers some of which are very amusing, together with clear colour graphics of the road signs.

To gain access to each set of headings you must keep reloading the tape and stopping. Unfortunately, the program can be unfriendly at times as it does not always instruct you where to stop.

The second side of the tape contains a demonstration with questions on the traffic light sequence and a demonstration only of the procedure at a level crossing.

Highway Code is produced by Learning Systems to 'complement the HMSO booklet *The Highway Code',* and I suggest you treat it as such. The tape is instructive for experienced drivers and learners alike, but it is not as comprehensive a guide to the highway code as the HMSO version. *Colette McDermott*

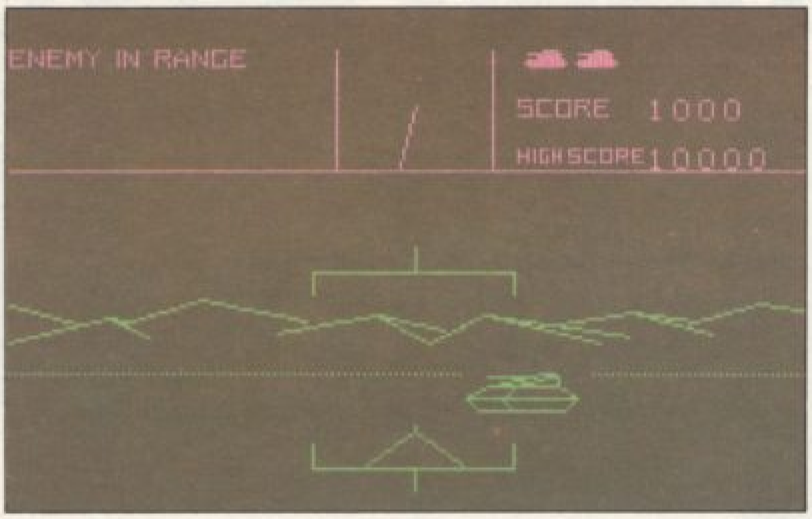
more software on page 38

Highway Code
Memory: **48K**
Price: **£6.95**
Gilbert Factor: **6**


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MATHEMATICS
GET READY TO READ
and a 64K
Plus excellent sprite graphics
About the only thing the Commodore 64 doesn't ha

Battle of the tanks

IT WOULD have been better if Atari had not given its permission to Quicksilva to produce **Battle Zone** as the game is no better than the original arcade version. Many companies at least try to add a new element to such games or put something extra into the graphics.

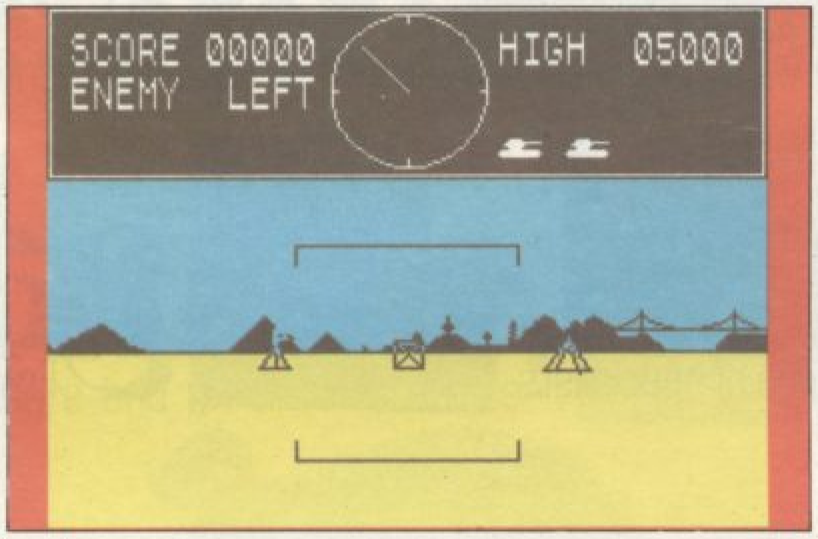


If by now you have not heard of the game the object is to move your tank around a landscape in which other tanks, space craft and flying saucers are on the prowl.

The bare instructions, found in the game and not on the cassette insert, tell you to hide behind objects which are littered around so that the enemy cannot see you before you make your move. The movement of your tank is difficult to master as the tank is on tracks. If you press the lefthand side of the keyboard the left track moves forward, shifting the tank right, and if you push the righthand keys the tank moves left. Time to reach for the Kempston joystick.

Forward movement shows the clumsiness of the 3D graphics which are inferior to the original. Outlines crack up, objects jerk when they move and missiles on target do not always score a hit.

While no better than Battlezone the Real Time Software **3D Tank Duel** does have a coloured landscape, the former being only green and black. The standard of graphics is slightly better than the Quicksilva version and the action is smoother but the tanks, spaceships and flying saucers move faster than your gun sights which will cause a problem if you are lucky enough not to have played the game before.



The instructions and key layout are better than the Quicksilva version so at least you can use the cassette insert if you need reminding about controls during play.

Neither of these games have much to recommend them except that you do not have to pay 50 pence a time to play in an arcade. If you are after classic original arcade simulations then both games are good buys. If you want excitement from your computer then just pass them by.

John Gilbert

BATTLE ZONE
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston**
Gilbert Factor: **5**

3D TANK DUEL
Memory: **48K**
Price: **£5.95**
Joystick: **Kempston, Sinclair, Cursor**
Gilbert Factor: **6**

Have Tardis will travel

KNOCK, KNOCK, Who's here. The Doctor's back, in search of **The Key to Time.**

This new text adventure from Lumpsoft features the veteran time traveller and many of his oldest enemies, battling it out through time and space. Davros, Daleks, Cybermen and fellow time-lords all show up as you steer your Tardis through the ages.

With the aid of a timescanner you must discover the scattered pieces of the great key and presumably save the universe into the bargain. Before you can begin the quest you will have to learn how to operate the Tardis.

Addicts of the TV series will find themselves in a well-known environment but the program is very friendly and will give considerable help to those who are less familiar with the bumbling doctor.

The program is responsive and versatile whilst the riddles are by no means obvious. It will get you zipping back and forth through time like nobody's business.

The Key to Time is good-humoured, well written and a joy to play.

Richard Price

THE KEY TO TIME
Memory: **48K**
Price: **£5.95**
Gilbert Factor: **7**

Credit for simplicity

FUNNY isn't it? Sometimes the games with the most simple of concepts can give just as much pleasure as programs of great complexity.

Tiler Tim by Microwish asks you only to move a grinning face across a grid pattern on the screen, avoid a deadly spider who dogs your tracks and occasionally stop another ghost-like character from undoing your good work of turning each small square into a different colour.

It is a cross between a painting game and Pacman, though there aren't any gobblers or killer ghosts. You move up a level after all the small squares have been changed and the action is progressively more difficult.

The graphics are bright and cheerful in almost fluorescent shades. Tim, the grinning face, zips across the screen at a fair pace making a noise like a geiger counter gone bananas.

No great strategic skills are necessary as the only real qualification to play is a quick eye and an even quicker hand. At first the spider seems sluggish but soon becomes a real hazard. Just as you think you have finished a screen the ghosts appear and you must stop them ruining your job.

Tiler Tim is very much a high-score merchant's game, deceptively easy and quite compelling. *Richard Price*

TILER TIM
Memory: **48K**
Price: **£5.95**
Joystick: **Kempston, cursor, joysticks.**
Gilbert Factor: **6**

Making the best of a bad night

YOU ARE a Wally, trapped in a nightmare in which familiar objects turn on you as you desperately try to escape from the manic dreamscape. All you have to do to wake up is find the alarm clock.

According to **Pyjamarama,** an hilarious arcade adventure with stunning sprite graphics, a Wally's idea of a nightmare means being hit by roast chickens, bowled over by spinning dinner plates, attacked by an astral machete, or buzzed by revolving saws. After all, that is what makes a Wally.

In order to reach the alarm clock you have to travel through rooms in which your wildest fantasies are acted out. The ceiling in one room is made up of a gigantic space invader game in which you must blast the invading aliens.

On your travels you must take time to pick up objects which may or may not be useful in the completion of your quest.

A variety of objects dog your movement but the secret passages, found on the ground floor within barrels, should speed you on your way. Bouncing upstairs and sliding down the bannisters will also bring the object of your quest nearer.

Once you have dodged the chicken bombardment, the flying scissors and the falling books you are beset by ghosts in the cellar. Some of the objects are not so familiar — not even Wally could expect a magnet under the table or a rocket in the hall.

The action, plot and graphics of Pyjamarama from MikroGen are great. This Wally is a winner.

John Gilbert

PYJAMARAMA
Memory: **48K**
Price: **£6.95**
Gilbert Factor: **8**

Wizard shenanigans

MOST adventurers will find themselves at home in the world of **Kentilla** a new mixed text and graphics game from Micromega.

Caraland is a place of magic, strange beings and heroes. A vile wizard, Grako by name, rules from his dark tower and spreads evil and destruction abroad. He possesses a moonstone, the source of his power and unless he can be defeated he will become undisputed ruler of Caraland.

Your role is, naturally, that of the budding hero and you must explore the scorched wastelands, caves and forests to find the means to defeat Grako. Urga-mauls, the local orc equivalents, will treat you with scorn and violence and you may be able to get help from Elva, a creature or person who will follow you rather like Thorin does in **The Hobbit.**

The overall plot is familiar and takes bits and pieces from many adventure sources. Indeed, Velnor himself — remember Velnor? — gets a mention in the credits.

The insert tells you straight away that the game is devious and gives little clues as to how best to progress in Caraland. The game is described as interactive and the varied beings will react to you in quite understandable ways. The amiable cavezats — rather ponderous cavern dwellers — will treat you amiably until you attack and will then go all out to slay you.



Speaking to characters may get results but they do not appear to be overly responsive. The graphics are clear and colourful and almost instantaneous, whilst the interpreter will accept a wide range of input.

There are a number of useful features — such as recall of the last command — and the cursor can be moved through an entry enabling swift correction. Despite those features the game seems slow moving and it is all too easy to spend time getting hardly anywhere at all. That is an obvious disadvantage and may well mean the program is just too devious for the average adventurer. Time will tell.

Richard Price

KENTILLA
Memory: **48K**
Price: **£6.95**
Gilbert Factor: **6**

Now get out of that

RIGHT FROM the beginning you realise you are up against it in **Eye of Bain,** the new Artic text adventure. There you are, tied to a pole in some stinking hovel, praying to every god you have ever heard of in the hope you will escape before the natives decide to have a snack between meals.

Being a fairly mighty warrior you have travelled to this awful place in search of a fabulously huge sacred emerald. The gem is called the Eye of Bain and lies hidden in the temple, somewhere near that loathsome village.

Life is not going to be easy. Once you have escaped you will have to avoid endless perils and solve numerous tricky puzzles to reach the holy precincts. Crooked pirates, nasty nomads and killer bees are merely a few of the problems you will encounter — and have you ever tried to persuade an ape to give you a spot of help?

The adventure follows the usual Artic format though if you 'Look' you will be shown a picture of your location. That is a sensible approach to graphics as no time need be wasted unless you feel like it.

Input is in the standard verb/noun combination but multiple entries can be made by putting a full stop between each instruction. That can save time but the interpreter responds very quickly anyway.

Artic seems to adopt a no-frills approach to their adventures. You may not get animated graphics or the chance to enter full sentences but you can be fairly sure of facing constant challenges and original problems. Eye of Bain continues this tradition and should provide many hours of solid entertainment. Great value.

Richard Price

EYE OF BAIN
Memory: **48K**
Price: **£6.95**
Gilbert Factor: **7**

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Automata's origin of the faeces

PLAYING THE part of a mouse dropping may not be everybody's idea of fun or even good taste but you will soon forget that representation when you start to play the new Automata masterpiece, **Deus Ex Machina.**

The plot seems simple enough. It takes place in the future and a large computer rules the political roost. The last mouse crawls to its extinction within the machine and as the nerve gas kills it the ultimate mouse dropping is released by the rodent.

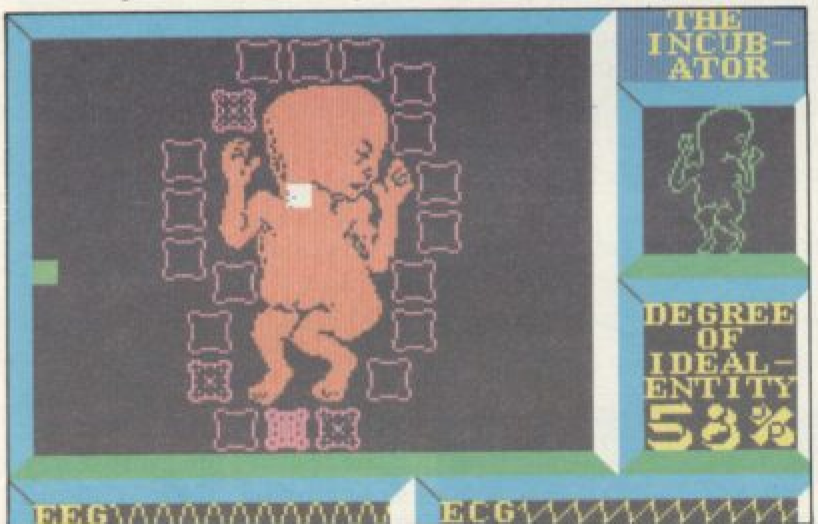
That is taken into the machine and the game, which takes up two sides of a cassette tape and an audio soundtrack, starts in which you must create a lifeform within the machine. You can take that lifeform, if it survives, from birth through middle age to old age, playing a series of weird games. Those make more sense when you listen to the soundtrack and realise that author Mel Croucher is trying to put a series of complex political, philosophical and theological points across.

The scenario is created, almost psychedelically, within the mind of the player with a background coloured by shades of Orwell's *1984.* When you have been born you are tested by the Defect Police who want to know everything about you. They probe you with their emotionless eyes, blinking out of the darkness and trying to discover the secret of your body and what lies within.

The game even depicts the life form's first sexual encounter, frightening and automated. The emotions evoked are standard and, of course, part of the system.

As old age creeps into the game, on the second side of the tape, you suddenly discover that it is not just the forces of government which are attacking you. Your body rebels as it grows old, and towards the end of the game you will have to fight blood clots and red cell destruction from within. Even that system which you trust all your life lets you down in the end.

Mel Croucher does however, give you some hope as your body dies. The final image is of a spinning embryo, one of the first images of the game. The circle is complete and even an accident rarely disrupts the system.



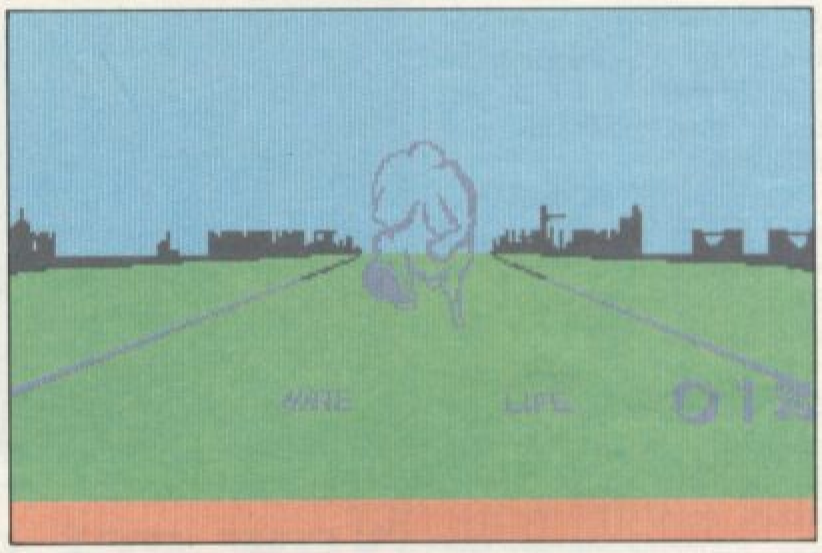
The game and its soundtrack, featuring the talents of John Pertwee, Ian Dury, Donna Bailey, Frankie Howard, E P Thompson and Mel Croucher, is a revolution in gaming technology. It has its genesis in the concept record album of the late 1960s and 1970s.

Croucher has cleverly manipulated the elements of computer gaming and brought in concepts usually found only in movies. The result is a piece of software which even those people who usually find games boring and computers even more so, will enjoy and play time and again. That is not to say, however, that the program is only for those who enjoy deep thought. Automata would have been foolish not to include classic elements of the arcade within its novel conceptual twists.

In the final analysis Deus Ex Machina is a game to be played first and talked about later. So, go ahead and do it. We won't look but we will guarantee — well, almost — that you will be intrigued.

John Gilbert

DEUS EX MACHINA
Memory: **48K**
Price: **£15.00**
Joystick: **Kempston, ZX**
Gilbert Factor: **9**



Blazing saddles . . .

WHEN YOU saddle up to play **Stagecoach** from Creative Sparks make darn sure that you put a lot of cotton wool in your strides or you will end up pretty sore in the nether regions — well, the cowboy on screen will anyway.

The game is an attractively animated Western split into three main sections. The jump comes first. There you are moseying over the desert when suddenly the stage appears. It is driverless, swaying and jolting all over the place.

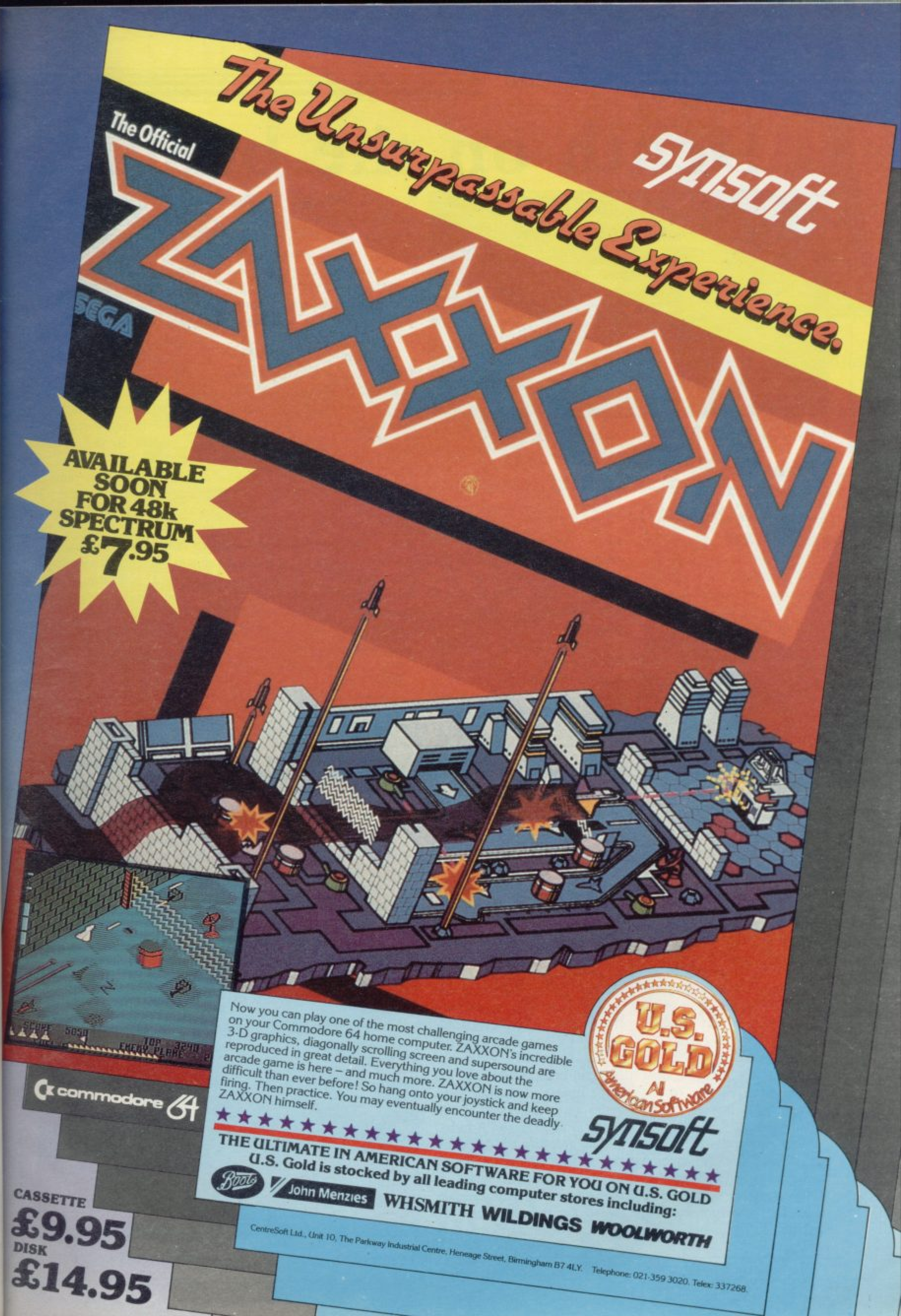
The idea is to steer your cowboy up to the stage and get him onto the coach roof. Dead easy you may say, but unfortunately the desert is filled with large cacti and bits of junk. Collide with these and you will be thrown off your mount. You will have to remount and set off after the stage again, wasting precious time in collecting the horse.

If you finally get on the stage you take the reins and guide it through the obstacle course of the mountains. On the way passengers must be picked up along with boxes of gold. Then come the Indians, whooping around the coach and threatening to take your passengers. Standing on the roof your cowboy can shoot them down . . . leaving the stage driverless again and prone to further collisions.

The graphics are excellent. The cartoon effect is very well done with bright colours and fairly smooth action. There are a number of different tasks, each needing skill and practice. Stagecoach is an exciting game, full of incident and variety. *Richard Price*

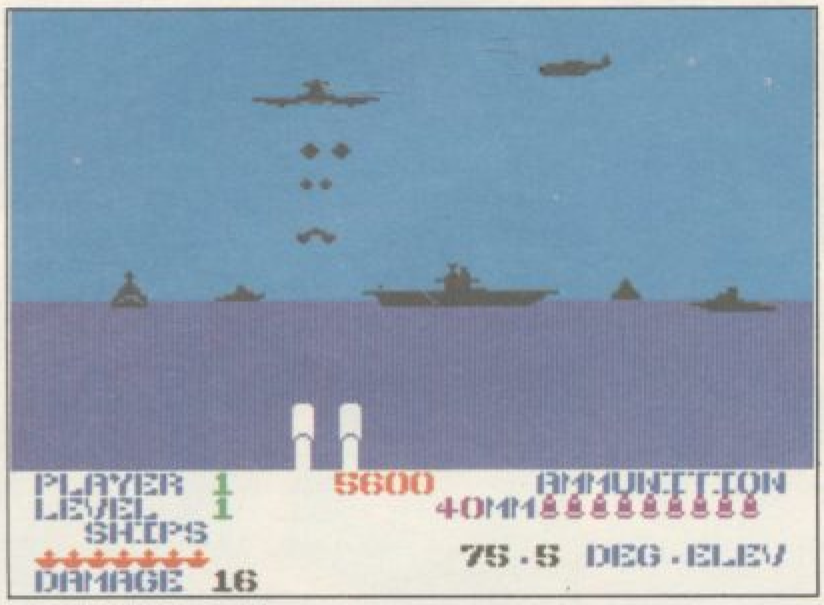
STAGECOACH
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston, Sinclair, Fuller, AGF/Protek**
Gilbert Factor: **7**

continued on page 42



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Death on the beach



A CALL TO General Quarters and a beach head invasion are the stuff of which generals are made but **Beach-Head,** a typical American import from US Gold, gives you the opportunity to fight the war single handed.

You guide your fleet around an aerial reconnaissance map making sure that you locate the enemy before they find you. Encounters at sea are shown in 3D with your ship's gun turrets at the bottom of the screen, firing salvos at the aircraft which fly in low releasing their bombs in suicidal strafing runs.

Once you have found the enemy base, hidden in a secret passage, and avoided torpedoes, rocks and mines, you can have a go at wreaking your revenge on the enemy.

The graphics used in the beach scenes and at sea are best experienced at least four feet from the computer where they appear to be realistic. Do not let that put you off what is an excellent game of arcade skill and strategy. It looks as if US Gold is intent on bringing the best of the US software to Britain. If this, its first conversion to the Spectrum, is anything to go by the American products should be well received.

John Gilbert

BEACH HEAD
Memory: **48K**
Price: **£7.95**
Joystick: **ZX, Protek, Kempston**
Gilbert Factor: **8**

Hawk swoops in for the kill

BLACK HAWK is one of the world's most sophisticated aircraft, jam-packed with missiles, cannons and similar deadly weapons. Jump in the cockpit, take off and head towards the enemy coast. Your mission — yes, you have guessed it — is to blow up everything you can as effectively as possible. After you have done that you also have to get away in one piece.

There are two playing screens. The first is a long range missile-firing screen. As the ground moves below, various enemy installations and war-machines appear. Those are two-dimensional and scroll down the screen in a map-like fashion. The ultimate aim is to find and destroy the enemy airbase. Once fired, missiles can be guided to the target with your joystick or control keys. Getting the hang of that will take some practice.

The second screen is for defending the plane against hostiles who manage to get through your missile screen undamaged.

Most dangerous of all are the SAM missiles which seem to get faster and faster as you progress up the score table. Extra weapon-systems are fitted to the Hawk if you score certain percentages of target hits. More and more targets and threats will also appear. There are two playing modes — tough and tougher.

Creative Sparks has produced a shoot-em-up of some complexity and the action is furious. The missile firing sight can get confusing at times and is barely visible over water. Controls are as fast as your reactions.

It is not a simulation, it will not stretch your intellect but it is difficult and demanding.

Richard Price

BLACK HAWK
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston, Sinclair, Fuller, AGF/Protek**
Gilbert Factor: **7**

Prehistoric piffle

BULGING MUSCLES and a pair of wings makes **Kokotoni Wilf** one of the most unlikely heroes to fly into a game since the first space invader hatched from its egg above an earth base.

His mission, to find the lost pieces of an arcane amulet for the wizard Ulrich, is a serious affair in which he could be licked to death by a tricerotops, zapped by a deadly egg or dropped on by a bat.

All those fates await the intrepid hero as he wings his way through several time zones and six lives in search of the fabled Dragon Amulet.

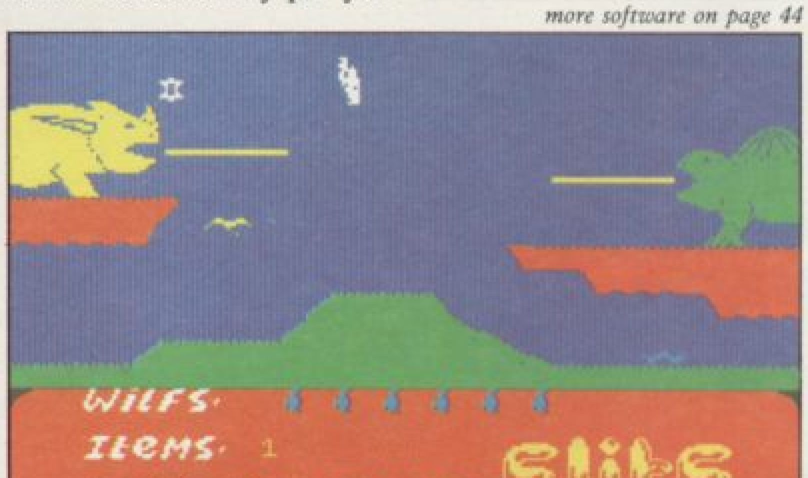
The graphics are as primitive as the dinosaurs which inhabit the upper levels of the game but the search, which can be compared with the search for drinking goblets in **Jet Set Willy,** is fun. Skill and cunning is required on the lower levels when Wilf encounters prehistoric alligators, swims through underground tunnels and gets hit by nocturnal seagulls.

Not having anything to fire at the monsters may put you off but for those who like to plan strategic play, and find a quiet corner of the screen, the game is excellent value.

John Gilbert

KOKOTONI WILF
Memory: **48K**
Price: **£5.95**
Gilbert Factor: **6**

more software on page 44



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page 44

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Rubbishy refugees

ASTROPLANER, from Romik, might come as something of a shock, if your copy is packaged like the one recieved at *Sinclair User.*

The cassette insert promises a game called **Beatcha,** about a school in which all the pupils must avoid the teachers. On loading, however, the program turns out to be a shoddy version of **Defender** which, to add insult to injury is mostly written in Basic with a few bytes of machine code added for good measure.

Why anyone would want to bring out yet another version of the traditional game is beyond reason. There are already many versions around for the Spectrum and to release yet another the manufacturer must either think it has exceptional graphics or that it contains a feature not included in other versions.

Unfortunately that is not the case it is a slow version of the standard 'stop the aliens dropping the refugees' story. The hilly terrain and spacecraft stand out on a violent green screen which plays tricks on the eyes, making the game difficult to play. The aliens look as if they have been imported from the Imagine **Arcadia.**

The keys are difficult to use because, with the copy we recieved, the main instructions about control of the spacecraft were given in the program. There are two keys which start the game. If the wrong key is pressed the player will not only not know what the game is about but will also have to press nearly every key to find the control and fire buttons.

The aliens against which the player has to pit wits belong in a school for the backwardly bug-eyed. You will get more action from a Venus flytrap.

Astroplaner is a definite disaster, a game to steer clear of unless you are making a collection of turkeys.

John Gilbert



ASTROPLANER
Memory: **48K**
Price: **£5.95**
Gilbert Factor: **2**

Bandits by moonlight

BY THE LIGHT of the bombers' moon a Lancaster weaves its way into enemy territory. Strapped in, shivering in the cold of high altitude, you clear the breeches of your machine guns and watch the night sky in apprehension. Barrage balloons drift across occasionally but suddenly the speck you thought was a star grows into the shape of a twin engined night-fighter. Here they come. Jinking and banking the fighters swarm up, guns twinkling in the darkness.

Night Gunner from Digital Integration is a multi-task arcade scenario casting you in the role of the turret gunner of the Lancaster. The main screen features the night-fighter attack. Against the starry background the enemy planes zoom closer and, by using deflection shooting, you must knock them out before they cause serious damage to the bomber.

Pilot reports and damage status are shown beneath the screen and there are three bombers available. After surviving the fighters you progress to a ground attack screen in which you must either bomb various targets from above or dive the plane to take out enemy tanks with rockets. Flak or searchlights will hinder you.

During dive-bombing you need to watch the altimeter carefully as it is easy to crash into the ground. Once that is finished you make the return journey to base, again fighting off savage attacks. Dificulty is progressive and there are thirty missions all told.

The night fighter graphics are quite impressive and are fast, smooth and distinct. There is a good feel of a dogfight though the balloons sometimes seem a little out of place as they swerve across the sky. The other screens are not as accomplished but remain exciting and taxing. The overall style has similarities with **Zzoom,** making this shoot-em-up a compulsive and demanding program.

Richard Price

NIGHT GUNNER
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston, AGF, Protek, Sinclair**
Gilbert Factor: **6**

A dream come true in NW3

HAMPSTEAD is, well, Afghans and jogging and all sorts of things. And Hampstead Man is, well, Jeremy — off to the city, playing squash, and taking Annabel and Toby out for a crêpe.

If you have ever wondered how Hampstead Man got there, you should try some software written by and for social climbers. Hampstead is not, after all, just a place — it's a way of life. And believe it or not, Hampstead Man may come from the humblest of origins.

To get to Hampstead with nothing but a UB40 and a tracksuit you have to know the form — what to wear, what to say, which newspaper, which muesli — and you may have to lie, cheat and steal to get there.

Collect the Wykehamist tie, passport to clubland and merchant banking and extract Art from an industrial labyrinth. Head off for Cambridge and Richmond — but be careful. Seek out Pippa, and then get round her father. Only when you have done all that are you ready for Hampstead.

Hampstead is a text-only adventure, written on the Quill. Using an all-purpose program limits the scope of the game, and Melbourne House, which produced **The Hobbit,** could have done better. A more serious irritation is a racist bias. Was it really necessary to have a grinning Pakistani in a north London Post Office, a 'foreign' voice on the station tannoy and middle eastern races selling hamburgers?

Despite its flaws you are sure to find Hampstead an entertaining romp up the social ladder.

Joanna Pegum

HAMPSTEAD
Memory: **48K**
Price: **£9.95**
Gilbert Factor: **8**

more software on page 46

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Pegum

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Ket reaches its climax

PAIN AND nausea sweep over you as you wake. Your head feels as if a troll has been using it as a football. Your mouth is dry and, judging by the darkness, your eyes are not doing too well either.

Slowly your vision returns and you make out a dim light. The stones beneath you are damp and cold and you finally realise that you are locked in a cell. Take a look round — there is only a chair. This is Vran Verusbel's dungeon and you are in it — right up to the neck.

So begins **The Final Mission,** last in the Ket Trilogy from Incentive. After a blow on the head at the end of the previous adventure our reluctant hero finds himself in a tight spot and must now escape to seek out and destroy Vran the vile necromancer.

The format remains pure text. Locations are boxed at the top of the screen and the score is displayed above the description — a useful idea as you will immediately notice if you perform some significant action. As ever, the interpreter is friendly and responds with variety and occasional flashes of humour.

Edgar, the assassin bug strapped to your neck, has become quite taciturn and is very sparing with help. When his tongue is loosed he will provide the occasional clue. Most of the time you are on your own in Vran's gloomy halls and subterranean passages. You will hear the patter of tiny feet and the crunch of giant ones behind you.

The problems are well up to standard, there is also the pull of the concluding portion of the prize winning sentence.

The Final Mission looks to be a fitting finale to the quest.

Richard Price

THE FINAL MISSION
Memory: **48K**
Price: **£5.50**
Gilbert Factor: **7**

Inscrutable plates

THROWING PLATES into the air and balancing them on poles might not be your idea of fun but obviously somebody at Ocean Software thinks that a **Chinese Juggler** makes a smashing game.

Your performer must take the plates from the piles set at the front of the stage and toss them into the air until they are the correct colour to go onto one of the poles.

Once you achieve the correct coloured plate you can spin it on one of the poles and return for another. That continues, together with odd intervals where you must re-spin plates which are threatening to fall, until all of the poles have been used.

After initial interest wanes the game becomes slightly boring and then excruciatingly so. Each level is easy and once you have been past the eighth or ninth level there is not much left to do.

The game has proved popular for the Commodore 64 which probably confirms what you have always suspected of Commodore users.

John Gilbert

CHINESE JUGGLER
Memory: **48K**
Price: **£6.90**
Gilbert Factor: **5**



Bikers bore in creepy castle

BMXers beware. Somewhere out there is a castle full of ghosts and treasure ready to take you into its dreadful maw. **Ghost Rider** from Positive Image features an intrepid bike rider competing in such a spectral motocross.

The game uses the platform format with the castle rooms split into six levels. The rider is shown as a silhouette figure pedalling away for dear life around the haunted pile.

Access to each level is by unpredictable elevators which must be ridden onto with some precision. Getting off the lifts is equally dangerous as there is only just enough space between roof and ceiling for the rider to fit.

Treasures such as crowns and golden cups are lying around on the platforms and all must be collected before you can go onto the next screen.

There are twelve screens each of increasing difficulty. The floors are patrolled by an assortment of ghosts and monsters all of which will kill our biker instantly if he makes a false move. The hazards are much the same on each screen though the structure of the platforms gets more fragmented.

On first sight the program seems relatively simple but in fact you must take great care to collect treasures in the correct order, or you will run out of fuel and be unable to reach the refuelling point in time. The golden cups are only accessible after the other minor items have been picked up and are often placed behind brick walls which create further obstacles.

Though the game is difficult and nerve-racking at times the graphics are rather bleak and flickery. The use of a white background results in a fair amount of glare and can be tiring after a while. The rather unspiring presentation counts against the program. So does the fact that it is extremely temperamental about loading.

Richard Price

GHOST RIDER
Memory: **48K**
Price: **£6.95**
Gilbert Factor: **4**

No picnic for bears

THE MOST interesting thing about **Gilligan's Gold** from Ocean Software is the difference between the demonstration and what is actually possible. The game is set in a mine, and you control what looks like a pink teddy bear from marauding green bears as you collect gold.

The pink teddy in the demonstration had great fun digging out gold with a pick-axe and dashing up ladders and lifts to deposit his finds in a wheelbarrow. A favourite ruse is to drop a bag of gold down a mine shaft and onto an unsuspecting bear's head, causing him to collapse and see stars.

Sadly, our team found it near impossible to pick up the gold or pick-axe or to manoeuvre the wheelbarrow. We could not even make use of the pit bus, which would run down a bear as soon as look at one.

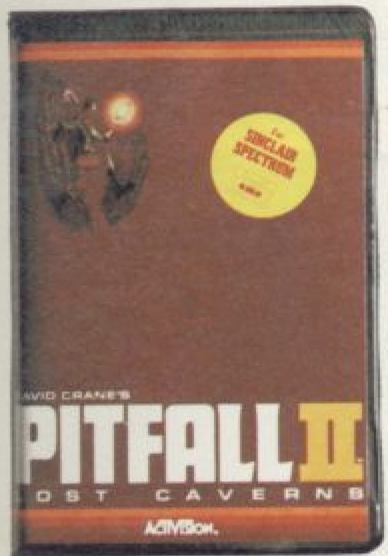
The speed and the attractive display show that it can be addictive.

Joanna Pegum

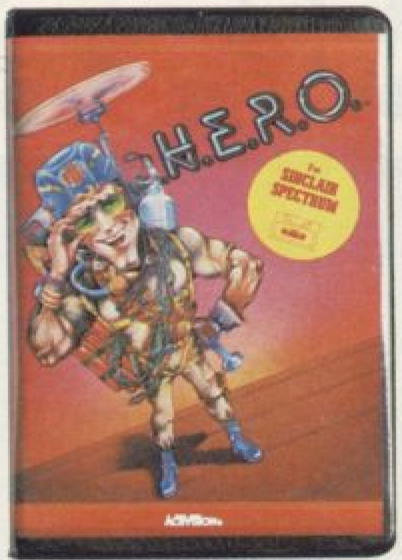
GILLIGAN'S GOLD
Memory: **48K**
Price: **£5.90**
Gilbert Factor: **6**


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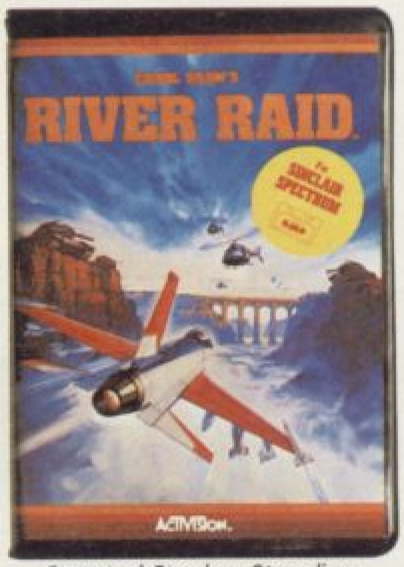
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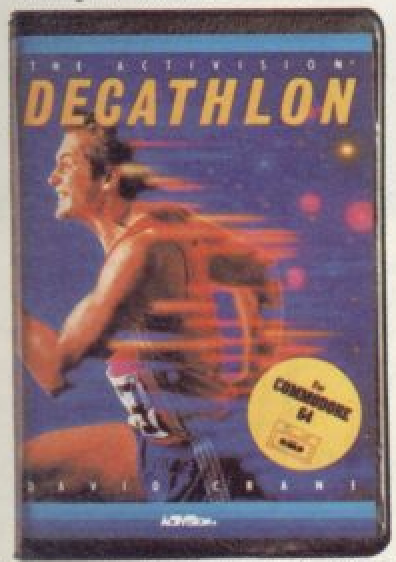
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Running on Commodore 64, Spectrum, MSX



Number one in the charts. And set to stay there. Decathlon asks for total commitment. Speed. Strength. Stamina. The will to win.
Running on Commodore 64



Merton the maintenance man is set for yet another routine night in charge of the toy factory. But something has gone terribly, terribly wrong.
Running on Commodore 64. Soon on Spectrum

Eight very different titles with one thing in common.

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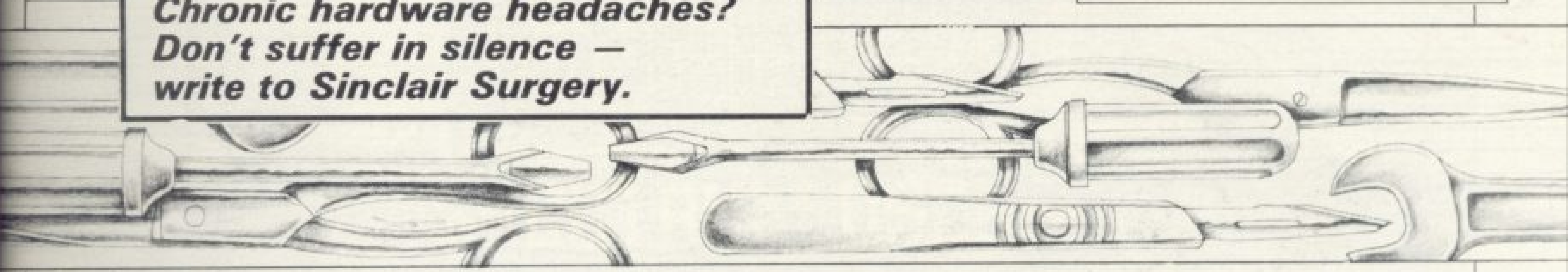
For more details contact Activision (UK) Inc, 15, Harley House, Marylebone Road, London NW1.

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Tape loading troubles

CAN YOU GIVE me some information on compatible cassette players for the Spectrum.

I have one which I bought with my Spectrum from Dixons. It is their own make and whilst I find it perfectly adequate for loading most pre-recorded tapes and my own programs, it does sometimes prove very difficult to load from certain pre-recorded tapes.

I usually have no problems with Psion tapes which will always load first time. On the inserts it says that the tapes are made to load over a wide range of tone and volume and it seems to give no problem whatsoever.

I have had the misfortune to purchase some cassettes that are very difficult to load. My latest purchase is **Full Throttle** by Micromega, and that refuses to load.

M E Kelly,
Weston-Super-Mare,
Avon.

● *From your letter the problem appears to be with the cassette deck. It may be simply that the head is slightly out of alignment or that it is not running at the correct speed. Take it back to Dixons, with your copy of* Full Throttle, *and explain the problem to them. They should either replace the deck or refund your money.*

Modems for amusement

I, LIKE many others using the ZX-81, am bored with its limited graphics. So I am forced to look for some other amusement, and the Prestel and Micronet systems seem the perfect solution Are there any modems available for the 81? If so do they need an RS232 interface?

Daniel Morgan,
Billingham,
Cleveland.

● *To run a modem from the ZX-81 you need an adapter. The Universal Modem Adapter by Comprocsys is the only one we know of which will work with the ZX-81 and give you Prestel-type graphics. It includes its own RS232 interface.*

Priced at a very reasonable £29.95, further details are available from Comprocsys, 129 Campden Road, South Croydon, Surrey.

Sizing up the sockets

I HAVE a Spectrum 48K, but as yet I have no portable cassette player to load and save programs with. I do have a tape deck — one component of a hi-fi, as opposed to a self contained tape player — but the MIC and EAR sockets on it are too large to take the leads provided with the spectrum.

Thomas Austin,
Stowmarket, Suffolk.

● *Your cassette deck would appear to use ¼in size sockets while the Spectrum lead uses 2.5mm plugs. Rumbelows, and possibly other electrical retailers, can supply an adapter which converts from one size to the other but you will have to experiment as to which MIC socket, left or right, will work.*

A better solution — would be to obtain the necessary plugs and sockets from a component supplier, such as Maplin, and to wire them up yourself. In that way you can ensure that the signal from the computer is recorded on both tracks, in mono, which will give a better recording.

Add-on of an antique age

AT ONE TIME there was regularly advertised a device called ZX-99, which was said to enable the ZX-81 to control a tape recorder and load sections of recorded data from a tape, at will. Its cost, if I remember rightly, was just under £50.00 but no advertisements for it have appeared since January 1983.

I wrote twice to the advertisers asking for details of the device — some sort of user's manual — but received no reply to either letter; I can only assume that they went out of business.

Can you tell me if any such device is now available for the ZX-81? The Memotech adjuncts would seem to be something like as effective — but the ZX-99 was said to allow access to even 1Mb of memory.

L G Unstead-Joss,
Edinburgh.

● *The ZX-99 for the ZX-81 was produced by Data-Assette, the last address we have is 44 Shroton Street, London NW1 6UB, Tel: (01)-258-0409. It was priced at £62.90 and allowed you to control up to four cassette decks, LOAD, SAVE and VERIFY programs and data and drive a RS232 printer.*

If you are still unable to contact them you could try Adams, 1 Lewin Road, London N16 7NL, who makes the RZ1 Tape controller, suitable for the ZX-81 or Spectrum, priced £25.00 which will control a tape deck, or BasiCare Microsystem Ltd, 12 Rickett Street, London SW6 which makes a paging system for both computers which allows you to access up to 1Mb of memory, and also relay controllers which can be used with cassette decks.

Joysticks for Jet Pac

I AM NEW to computers and have bought a Spectrum and Interface 2.

I have found that some of the games can be played with a joystick and Interface 2, but many, like **Jetpac,** do not work with it.

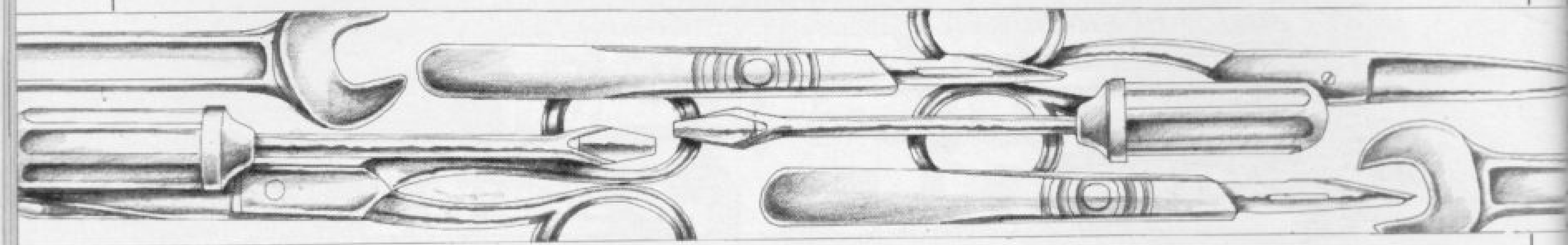
I have written to Sinclair Research about this, but they do not reply to individual queries. What I need to know is whether the Interface 2 is programmable so that a joystick can be used with games which are Kempston or cursor compatible, and if so, how is it done.

Jeff Ashby,
South Woodham Ferrers,
Essex.

● *Unfortunately, there are now three different standards which joysticks can use: Sinclair, cursor and Kempston. There is no easy way that a program written for one standard can be converted for use with another.*

The answer is to buy either a programmable interface, which allows you to nominate which keys you want to use, such as that from Fox Electronics, or one which can switch between standards such as those from RAM Electronics or Protek. As you already have Interface 2 then the adapter lead from Abtron, 38 Rydens Avenue, Walton-on-Thames KT12 3JP, priced £7.99, will allow you to use games which use the cursor keys.

more on page 52



Panasonic printers

I USE a Panasonic KX-P1090 matrix printer with my Spectrum and Interface 1. The printer is capable of reproducing graphics using bit image designation commands. Can you give me a substitute for the Spectrum COPY-command that transfers the screen to the printer?

Ove Enqvist,
Helsinki, Finland.

• *Interface 1 does not have any commands built in which enable you to COPY the screen via the RS232 port. The only way is to write a routine to do that for you. Without resorting to machine code the following Basic program should prove useful, it simply uses the POINT command to read the screen and then sends the information to the printer. It will work on any Epson compatible printer, such as the Panasonic KX-P1090.*

The only things to bear in mind are that POINT does not work on the bottom two lines of the screen so the routine will only COPY the top 22 lines and secondly, as Sinclair Basic is fairly slow be prepared to take a coffee break.

```
  10 FORMAT "b"; baud-rate: REM s
et to printer
  20 OPEN#3:"b": REM open binery
channel to printer-using channel
3 so you can use LPRINT
  30 LPRINT CHR$ 27;"A";CHR$ 8;:RE
M set 8/72 inch line spacing
  40 FOR y=168 TO 0 STEP -8
  50 LPRINT CHR$ 27;"K";CHR$ 0;CHR
$ 1;: REM prepare for 256 bits of
data
  60 FOR x=0 TO 255
  70 LPRINT CHR$ (POINT (x,y)+2*POI
NT (x,y+1)+4*POINT (x,y+2)+8*POIN
T (x,y+3)+16*POINT (x,y+4)+32*POI
NT (x,y+5)+64*POINT (x,y+6)+128*P
OINT (x,y+7));: REM assemble data
bit and send it
  80 NEXT x
  90 LPRINT CHR$ 13;CHR$ 10: REM s
end carriage return/line feed-adj
ust to printer
 100 NEXT y
 110 LPRINT CHR$ 27;"A";CHR$12: RE
M reset line spacing
```

Stonechips sob-story

AFTER spending months looking for a Stonechips programmable joystick interface, I succeeded in buying one.

I went on to tackle **Jet Pac** and eventually managed to bring the game under joystick control. That however, took over an hour of stretching fingers to press three keys and move the joystick at the same time.

I have only attempted to use the interface twice since and have now decided to get rid of it and settle for a Kempston. Please could you tell me how to do that?

Gavin Lake,
Hertford,
Hertfordshire.

• *If you are unhappy with anything you have purchased then go to the shop where you bought it and ask for your money back. Not many shops will do that without a great deal of argument.*

If possible, try the add-on in the shop before buying or read reviews of it in magazines, such as Sinclair User.

As regards selling the interface, your only hope is to try the classified pages and hope that someone who has not read your letter will buy it.

Connections made clear

WOULD someone please explain to us mortal users the pin configuration of the Sinclair Interface 1 RS 232 port.

I long to use the RS 232 port to drive my OKI Microline 82A Dot Matrix Printer, but have been unable to sort out the signals and pins from the Interface 1 unit to the standard 25 pin D type connector.

I am currently able to use the printer, but only when driven by a parallel interface. However, that does take up valuable RAM, which could be put to better use in the construction of program data.

Timothy M Gray,
Orpington,
Kent.

• *Page 49 of the Interface 1 manual shows the pin arrangement of the RS232 port. What has confused many people is that it is configured as a DCE (Data Communication Equipment) device which actually means that half the pins are the 'wrong way round'.*

Pin 2, which is marked TX data, receives the data and so should be connected to the TX data pin of the printer. Similarly Pin 3, RX data, is output and so connects to the RX data pin of the printer. The following table should make things clearer — NC means no connection.

Interface 1 Pin	Printer Pin	Function
1	—	NC
2	2	TX data-data from printer to interface
3	3	RX data-data from interface to printer
4	20	DTR-Data Terminal Ready-interface ready to receive
5	5	CTS-Clear To Send-printer ready to receive
6	—	NC
7	7	Ground-Earth
8	—	NC
9	—	NC-not required by printer

Plugging in RAM packs

I RECENTLY bought a 32K Cheetah Ram pack to increase the capacity of my 16K Spectrum to 48K.

Which joysticks are compatible with the system, and secondly, is it possible to place the 32K Ram pack "contents" within the Spectrum and then upgrade to a more professional keyboard.

E Shufflebotham,
Manchester.

• *The Cheetah RAM pack should be compatible with all joystick interfaces.*

It is theoretically possible to put the contents of the RAM pack inside the Spectrum but in practice it would prove difficult. You may find it easier to purchase a flexible connector which will overcome the problem of fitting it onto the back of a full-sized keyboard.



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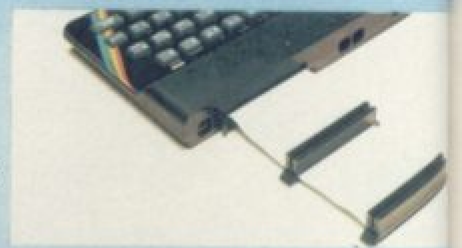
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  - ● delete
  - ● → ← ↑ ↓
- ★ Extra keys for left-handed users.
- ★ Full-size space bar.
- ★ Numeric pad with decimal point.
- ★ Double width enter keys.
- ★ Quiet action on gold contact switches.

HOUSING:
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Spectrum makes music

AN UNUSUAL and costly device for the Spectrum is MIDI interface manufactured by Siel (UK) Ltd. MIDI stands for Musical Instrument Digital Interface and it is a standard format for the exchange of information between digital musical instruments, those typically being keyboard instruments such as synthesisers. The information it handles is the pitch of the note, duration of the note and dynamic information such as the speed at which the key has been pressed.

It was decided to test the Siel interface on the Siel DK600 synthesiser and the Siel Expander - although it will drive any MIDI compatible instrument — using two Siel software cassettes, the Live Sequencer and Expander Editor, both for the Spectrum.

The instructions for connecting instruments to the interface were a little confusing, and Siel would do well to give more explanation here, although its instruction manual gives the full protocol of the MIDI standard, invaluable if you want to write your own programs for it.

With the DK600 connected to the Spectrum via the MIDI interface, the Live Sequencer allows the computer to record a single polyphonic track in real time as you play it on the keyboard. It can then play it back. There is a function for varying the tempo of playback and for producing refrains by looping. When you have perfected your tune you can save it onto cassette for later use.

The second piece of software, the Expander Editor, is for the Siel Expander. The Expander is just another DK600 synthesiser but has no keyboard or controls. To set it up you can either load it from the DK600 or from the Spectrum using the Expander Editor. That gives a high resolution graphics display of the controls, and via menu and graphics options all the controls can be set from the Spectrum.

You can judge when you have set up the sound by using the pre-programmed note and chord sequences and adjusting until they are correct. It also has a HELP facility for explaining what effect the controls have on the sound. A very nice piece of software indeed.

The whole system is very impressive and of high quality and, as you may by now be thinking, it is not cheap.

The MIDI interface retails at £99.00 including the Live Sequencer. If brought separately, the latter is £22.00. The DK600 six voice polyphonic synthesiser is £999.00 and a six voice Expander is £649.00. Siel is bringing out the MK9000 keyboard instrument which will retail at £449.00. The Expander Editor costs £53.50. Siel is planning more software for the Spectrum and if you are interested in music you should look at the Siel range. In terms of technical ability and ease of use it is good and inexpensive compared to other equipment on the market.

Siel (UK) Ltd, is at Ahed Depot, Reigate Road, Hookwood, Horley, Surrey, RH6 0AY. Tel: (02934) 76153/4.

Cassette cards

SINCLAIR User is always on the look-out for new ideas and we have now found a Christmas present for the micro user who has everything. Tape Tabs are sets of ten cassette inlay cards with high quality pictures on the front.

You can choose from pictures of cowboys, motorcycles, astronauts, women's bottoms, hamburgers, modern art, *Dungeons and Dragons*, science fiction or even arcade games. There are also DIY Packs with self-adhesive fronts so you can add your own pictures.

Tape tabs are priced at 85 pence per pack. For details of availability contact Tape Tabs Ltd, 70 Orbel Street, London, SW11 3NY.



Saga keyboard care

AN ERROR in the October issue of Sinclair User gave the impression that the Emperor keyboard from Saga Systems could not easily be used with Interface 1 and microdrives. The article should have read "add-ons such as Interface 1 connect without difficulty."

Saga has also informed us of its new range of carrying cases and dust covers for the keyboard and computers. The carrying case is made of waterproof vinyl with two compartments made of a shatter-proof ABS with a thick high density black foam lining. It has black leather straps and carrying handle which is riveted into position. It costs £26.95.



The dustcover fits the Emperor keyboard and is made of nylon. It can be obtained for £4.49.

Finally, Saga is about to release a peripheral kit which includes the keyboard, Soundboost, Flexicable, Paddle board, carrying case and dustcover. More information about the Saga System peripherals for the Spectrum can be obtained from Saga Systems Ltd, Woodham Road, Woking, Surrey, GU21 4DL.

QL conversion

THE LATEST item for the QL is a serial to Centronics converter from Tyepro Ltd.

It is housed in a grey plastic box and on one side there is a built-in lead to the printer. You must furnish your own lead to connect to the QL, but the ample instructions advise you on how that should be done.

The unit will drive standard Centronics interface printers from the QL RS232 printer interface, and so scores over normal Centronics interfaces in that no extra software is needed to control the interface. You are, in fact, using the RS232 interface inside the QL, together with its software. It has a switchable baud rate, via a dial switch inside the unit, from 150 to 19200 baud, so is adaptable to most printers. It is supplied set for 9600 baud, the setting for the QL Super Basic

Though the converter is powered from the QL it does have a facility for running from a battery, should you want to use it on other computers, such as the Spectrum with Interface 1. The instructions also have a fault-finding guide.

All in all, for £49.95 a reasonable investment. It is obtainable from Tyepro Ltd.

more hardware on page 59

Why wait any longer?

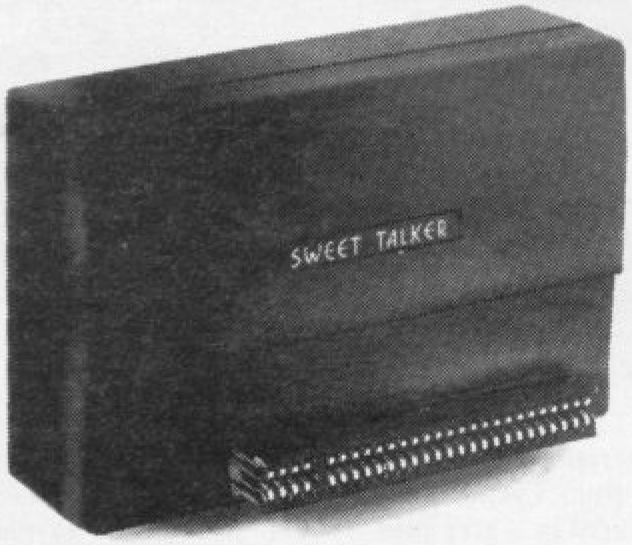
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Telex: 8954958.

Long leads on drives

CLASSIFIED Product Services has recently increased its range of leads for the Spectrum and QL. In addition to the Spectrum flexible connectors — see *Sinclair User,* August — it can now supply extra long microdrive leads and RS232 cables.

The microdrive lead, which is 42cm long as opposed to the standard 8cm, is £8.50 and the RS232 leads are £10.95 for the Spectrum and £10.00 for the QL, both cheaper than Sinclairs'.

Other leads are available to extend the ariel or joystick leads. For further details contact Classified Product Services Ltd, Shire Hall, The Sands, Appleby-in-Westmorland, Cumbria CA16 6XN.

Keyboard has class

THE LATEST add-on keyboard to hit the crowded Spectrum market is the Cheetah 68FX1 from London MicroTech Ltd, marketed by Fox Electronics Ltd. Aimed at the upper end of the market it has 65 keys, using proper switches, including 13 single key functions and a 145mm long space bar. Those are arranged as a main keyboard with a separate numeric pad and are printed in two colours, black and red.

On the left is a true Shift Lock key — one press puts the lock on and the second takes it off — and two blank keys. While, in theory, you could wire those for your own needs, in practice it would be extremely difficult as the leads to the switches have been cut so short as to make them inaccessible.

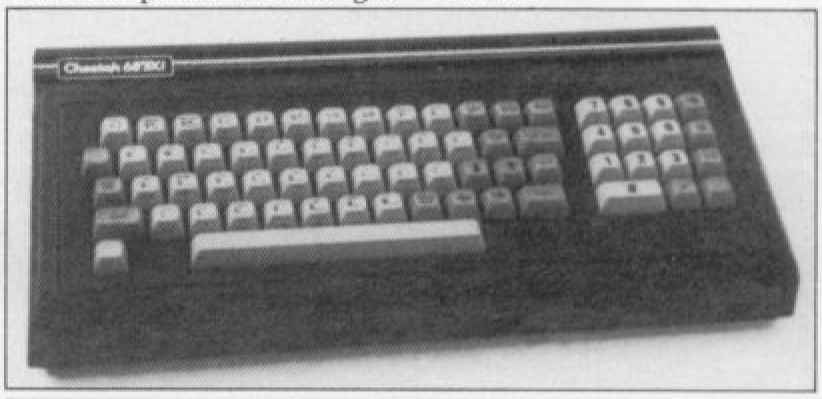
To the right the single key functions are Edit, Delete, Break (Caps Shift and Space), Graphics (which toggles on and off), Run (R followed by Enter), four shifted cursor keys and an extra Caps Shift. The only obvious omission is an 'E' mode key, particularly as there are not two shift keys conveniently adjacent.

Fitting it entails removing the Spectrum from the original case and then mounting it on pillars on the base of the keyboard. Two ribbon cables from the new keyboards then fit into the top of the PCB and the whole assembly is screwed together. That is like most other full-sized keyboards and should not be a problem.

If Interface 1 is to be fitted then the pillars are changed around and the interface sits underneath the base of the keyboard. The instructions for that are not very clear so trial and error will be needed. As the base is of metal great care should also be taken.

Overall, the keyboard has a good feel to it, it is solidly built and while the keys are heavy they will probably loosen with use. The shifted cursor keys are useful for program writing or word processing and the lack of 'E' mode key could be overcome with familiarity.

The price of £59.95 inc. puts it near the top of the scale but even so it is still good value. It is available by mail order from Fox Electronics Ltd, Fox House, 35 Martham Road, Hemsby, Great Yarmouth, Norfolk NR29 4NQ. Tel: (0493) 732420.



Cubs on screen

AN ATTRACTIVE alternative to the common TV set is provided by the Microvitec Cub monitors for the Spectrum and QL.

The Spectrum 452 Cub, cased in metallic black, is supplied with an interface lead which plugs into the back. The connection to the Spectrum is made using a PCB which slots onto the bus at the back of the computer.

Picture quality is excellent and the definition of graphic and textual displays beats that of a television set. The reason for that is that the dot density on a TV screen is much thinner than that of the monitor. For business purposes the 452 will show charts with remarkable clarity and will be of great help in spotting the mistakes in word processed text as the quality of the picture will reduce eye fatigue.



For the QL the interface arrangement is much simpler because of the RGB port at the back of the machine. The lead is supplied as well as Sinclair Research.

The Cub 653 for the QL is smarter than the Spectrum version and is built into a black plastic moulded casing. Its definition enhances the QL display in both television and monitor modes.

Both monitors have a 22in screen. The Spectrum version can only be switched off at the mains whereas the QL Cub contains an illuminated switch at the front of the base.

The QL monitor costs £275.00 and the Spectrum Cub costs £225.00. Both versions can be obtained from Microvitec PLC, Futures Way, Bolling Road, Bradford, BD4 7TU.

After the lights go out

TIMELY arrivals for the ZX-81 and Spectrum are the Nike-81 and Nike-SP from Cambridge Microelectronics Ltd. They are small boxes with rechargeable batteries which, in the event of a power cut, maintain the power to the computer so you do not lose your program.

On top is a switch to turn the computer on and off and two LEDs, a green one to show the computer is on and a red one for when the mains fail.

The box also contains a mains filter which stops any mains-borne interference from blowing the program. To test that a printer, TV, lamp, disc drive and the computer were connected through one switch which was turned off and on again without losing the program, a very severe test for any filter.

In use the box keeps itself charged and, in the event of a power cut, it can support the computer, interfaces and RAM packs for a minimum of 30 minutes. If you use your computer seriously then this is a vital addition.

Both the Nike-81 and Nike-SP are priced at £19.95 inc. and are available from Cambridge Microelectronics Ltd, 1 Milton Road, Cambridge CB4 1UY.

more hardware on page 16

Auto-fire Bud interface

YET ANOTHER joystick interface from a new hardware company made its appearance at the last Microfair. The Interstate 31 from Bud Computers Ltd is a standard Kempston interface — i.e. it will work with all Kempston compatible games — but has two additions.

On some games you must repeatedly hit the fire button as only one bullet/rocket/bomb is fired for each key press. With this interface a small switch is moved to the 'Auto' position and now by keeping the fire button pressed you maintain firing, a great saving on both finger and keyboard. Secondly, a reset button has been included, allowing you to break out of a machine code game without pulling the plug.



As is all too common these days, the interface does not have a through connector for other add-ons. It sits flat and there should be no problems with the joystick lead fouling the computer if you have a full-sized keyboard.

Bud Computers Ltd is at 196 Milburn Road, Ashington, Northumberland NE63 0PH. Tel: (0670) 856616. The interface is priced at £11.95. It is guaranteed for 18 months or 30,000 Galactic miles, although no one has yet claimed under the latter.

Special monitor

THE NEW 14in, 1302-2 High Resolution Monitor from Opus Supplies is one of the few monitors which has been specially configured to work with the QL. It gives a clear 85 character display.

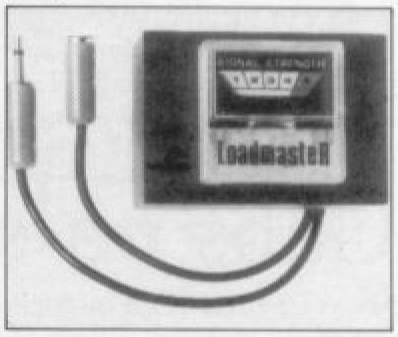
It is housed in a large cream case with the on/off switch and brightness controls to the right of the screen. All the other controls — height, vertical and horizontal hold, are well concealed in the back of the set. To get to them the instructions suggest that you poke a screwdriver through the ventilation slots in the back. Not something that should be recommended. Fortunately the set should not need any initial adjustment.

The monitor is priced at £299.95, including VAT and delivery, from Opus Supplies Ltd, 158 Caberwell Road, London SE5 0EE.

Reading volumes

WHEN LOADING programs from tape a VU, or signal strength, meter is an invaluable aid. The Loadmaster Volume Indicator from Probemaster is a meter which plugs into the EAR lead between the cassette deck and computer and displays the volume which the computer is receiving.

Priced at £11.49 it provides a useful addition if your cassette deck does not already have a meter. From Probemaster Ltd, 23 The Ridgeway, Cuffley, Potters Bar, Hertfordshire EN6 4BB.



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Epson RX80 F/T	£245.00
Epson FX80	£316.00
Brother HR15 Daisywheel	£339.00
Epson FX100	£435.00
KAGA/TAXAN KP910	£349.00
Centronics or RS232 Printer cable	£8.00

(Please specify which is required) Carr. on Printers £7—Securicor

Watford Electronics

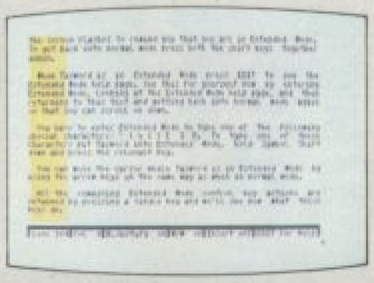
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Tasword Two word processor

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Tasword Two has all the essential features of professional word processing packages – move and copy, insert, margin settings, 'help' pages, find and replace, and much more.
Written by Tasman Software Ltd.
Usual price (RRP): £13.90.



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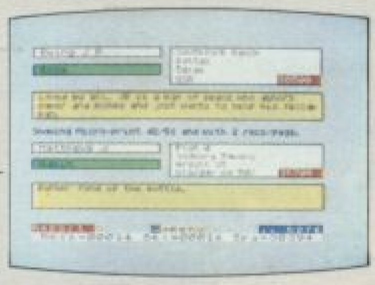
There's never before been an easier, more enjoyable, way into games design.
Written by Quicksilva Ltd.
Usual price (RRP): £14.95.



Masterfile filing system

Address lists…personal files…stock inventories…stamp or album collections…club records…recipes…if you can file it, you can Masterfile it!

Masterfile is a menu-driven filing and retrieval system of immense power. Display formats are user-defined, so the range of applications is enormous.
Written by Campbell Systems Ltd.
Usual price (RRP): £16.95.



Ant Attack

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Your task is to enter the walled city, seek out your captured partner, and escape. At all times you can choose from four angles of view. But beware: the city is patrolled by giant ants…
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This software alone would normally cost you over £50. Yet the Sinclair price for the complete ZX Spectrum Expansion Pack is just £99.95!

You'll find full details of its contents in the panel opposite.

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The ZX Microdrive is a revolutionary fast access/mass storage device. And it's the only truly affordable alternative to disc drives…

- Loads or saves up to 85K of program or data from Microdrive cartridges.
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- Only 9 seconds to load a typical 48K program.

The ZX Microdrive cartridge – a unique storage medium.

Smaller than a matchbox, the ZX Microdrive cartridge packs in a massive amount of data and programs.

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ZX Interface 1–adds powerful new capabilities to your Spectrum.

ZX Interface 1 connects to the back of your Spectrum and controls up to 8 Microdrives. (Additional Microdrives are available for £49.95 each.)

It also gives you:

- An RS 232 interface – to link your Spectrum with full-size printers, other computers using RS 232 (the industry-standard interface) and provide data transmission over telephone lines, via modems.
- ZX Net – lets you set up a local area network of up to 64 Spectrums, for high-speed data communications between you and Spectrum-owning friends.

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The ZX Spectrum Expansion System adds an exciting new dimension to Spectrum and Spectrum + computing. At £99.95 it's superb value too.

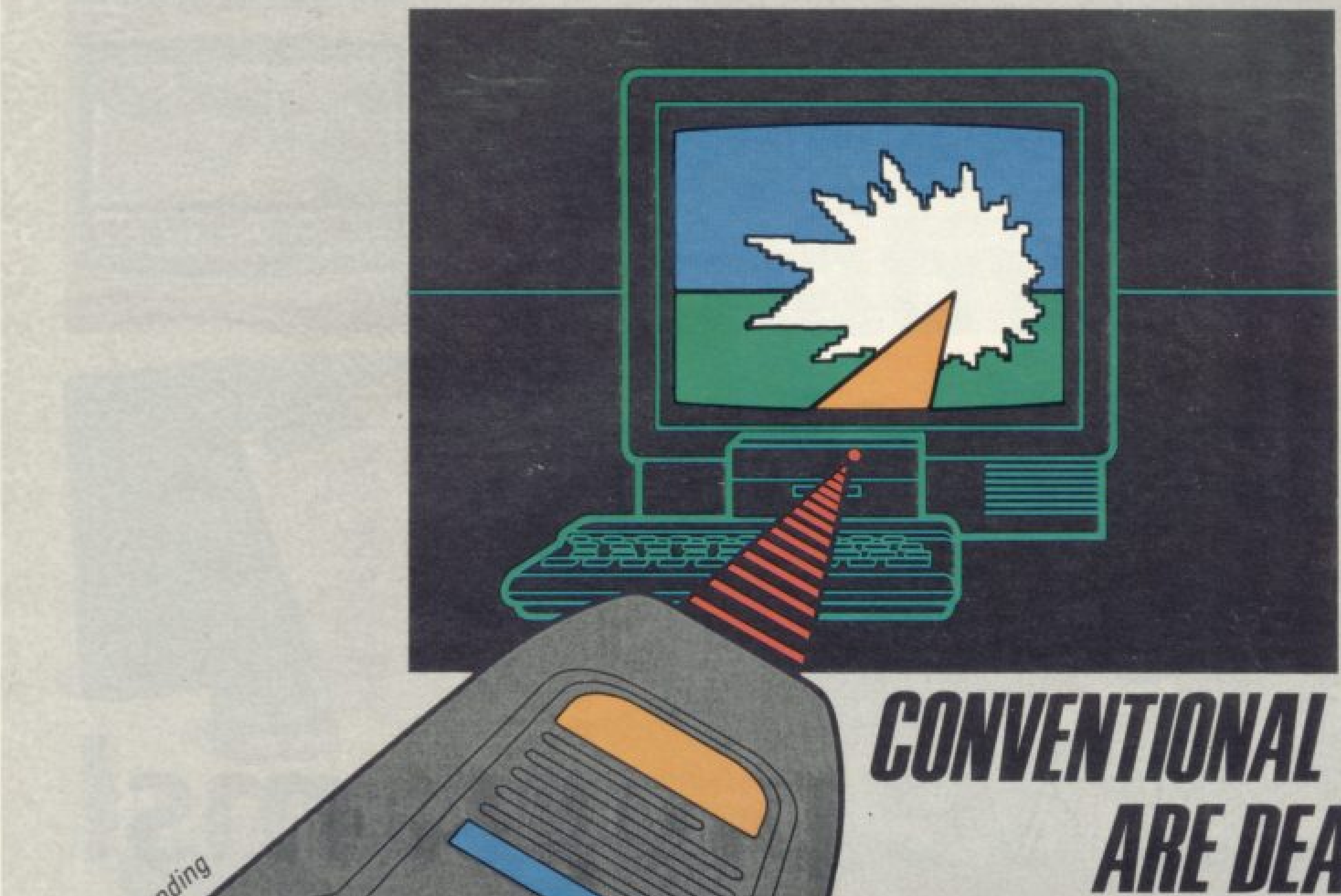
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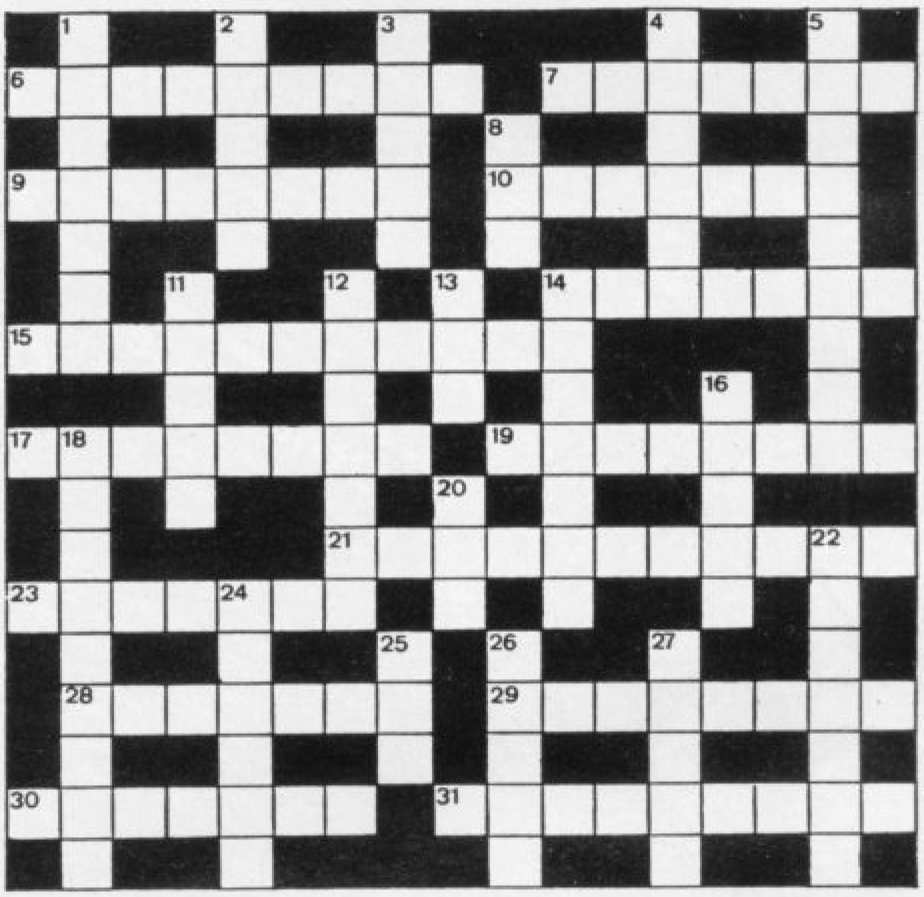
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The hacker's crossword

To delight and infuriate you, Sinclair User proudly presents a silicon crossword of heroic difficulty. Tougher than the Times, more devious than the Daily Telegraph, this one will have you racking your brains long after the last carol-singers have faded into the distance.

On the other hand, knowing our readers, you will probably finish the whole thing in fifteen minutes flat.



Solution on page 238

ACROSS

6. *A frenetic compiler for the boundary between hardware units (9)*
7. *Set of instructions in support of the weight (7)*
9. *Automatic checker of the truth, perhaps (8)*
10. *Voltage change done on the spur of the moment? (7)*
14. *Repeat a mathematical procedure (i.e. treat differently) (7)*
15. *Record update needed for a business deal (11)*
17. *Hardcopy certificate (8)*
19. *Anaesthetised deer regrouped and counted! (8)*
21. *Go astray or account for the list of mistakes (5,6)*
23. *Output device with strong union at the press? (7)*
28. *Cut drug with variable resistance (4–3)*
29. *Signs of life in data-processing revealed by cavity, it seems (8)*
30. *Castle managed in high-level language (7)*
31. *Programmed instruction given to the Police (9)*

DOWN

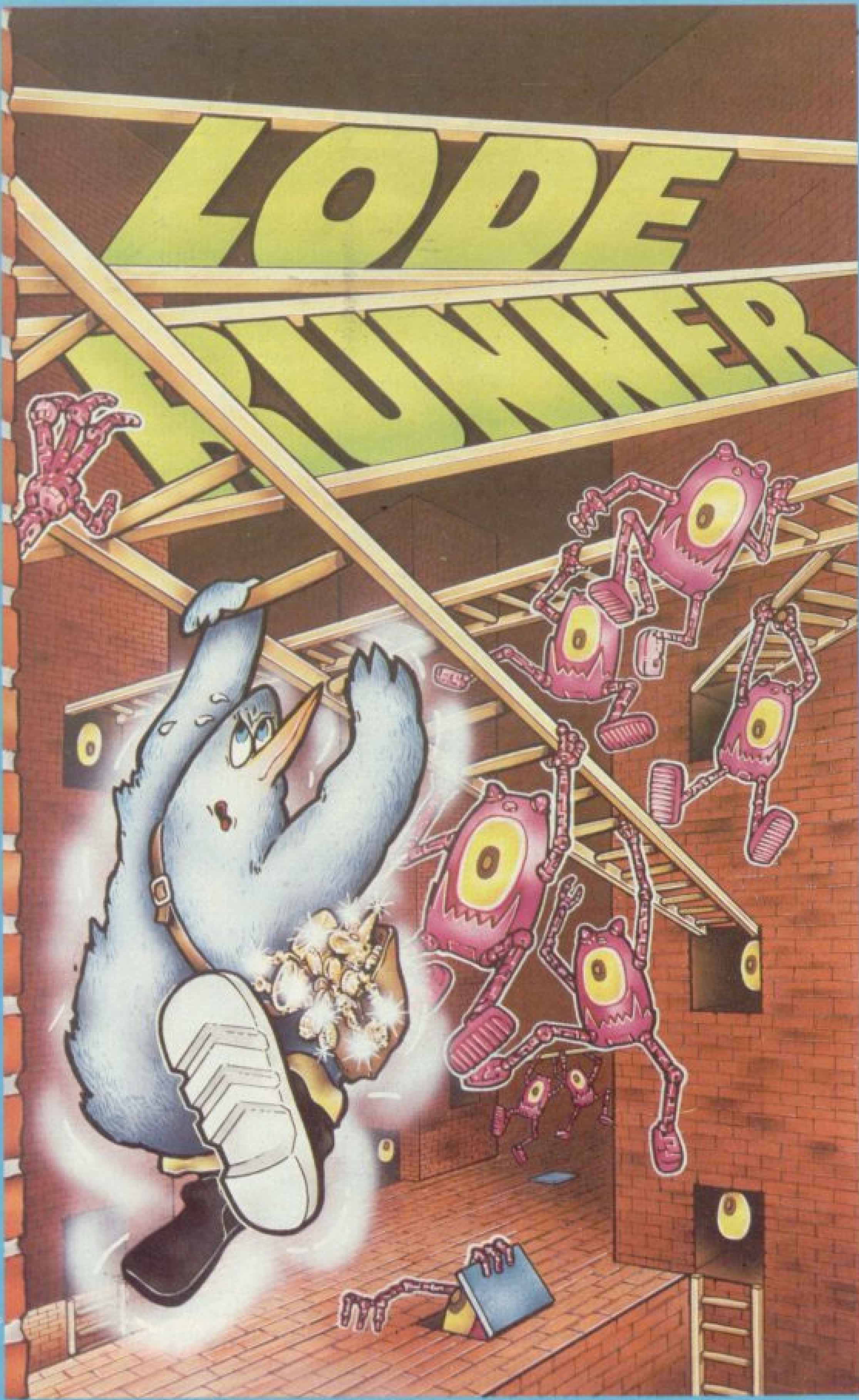
1. *A whole number (7)*
2. *Voltage fluctuation causing continental movement? (5)*
3. *Micro built on car scrap (5)*
4. *Part of 7 needed for the space capsule (6)*
5. *Suitable output medium for press bureaucracy? (5,4)*
8. *Basically a stupid statement concerning arrays (3)*
11. *Put in data back-to-front (5)*
12. *Sampling device used to monitor pregnancies? (7)*
13. *Match record with top-twenty single?*
14. *Question posed at the console (7)*
16. *Assembly-level secretaries? (5)*
18. *Addition or subtraction, for example, could be performed by the surgeon (9)*
20. *A vertical redundancy check, initially (3)*
22. *Humdrum set of instructions (7)*
24. *Old digital alarms for eggs? (6)*
25. *The oracles channel (3)*
26. *Interrupts the program when the apprentice has tea brewed (5)*
27. *Collections of records on life's mystery? (5)*

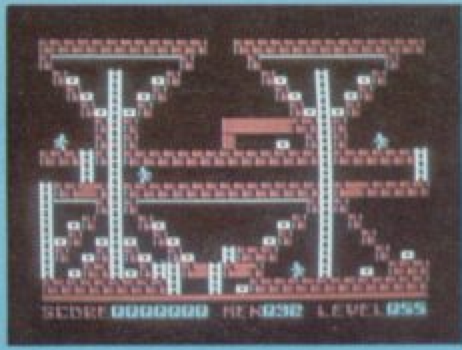


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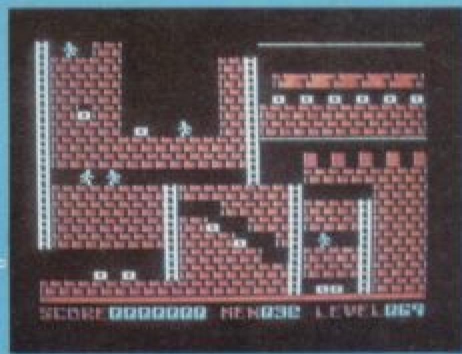


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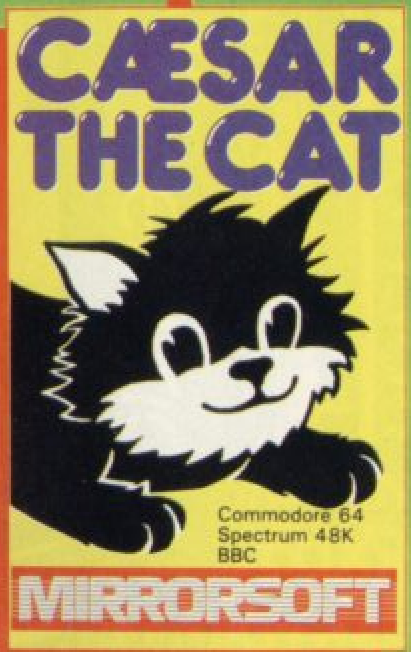
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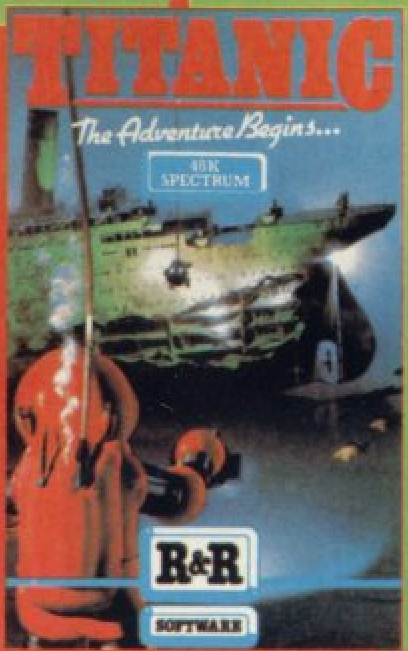
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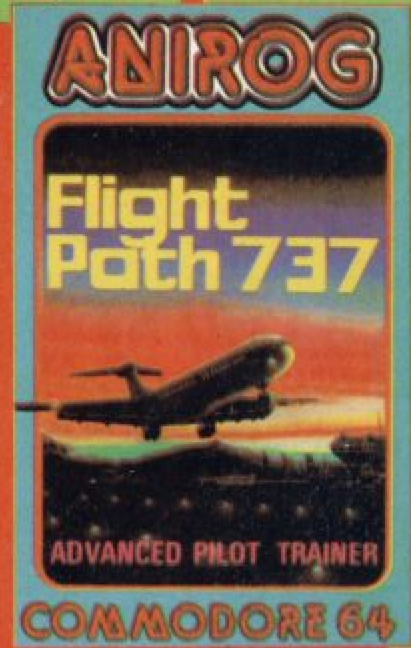
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DAILY Mirror — sinclair user

SOFTWARE TOP 30





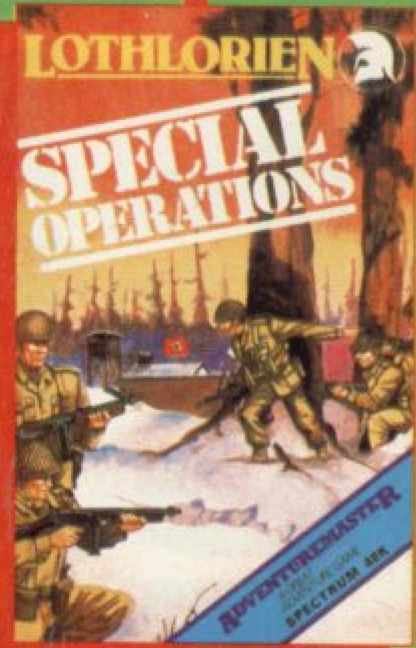


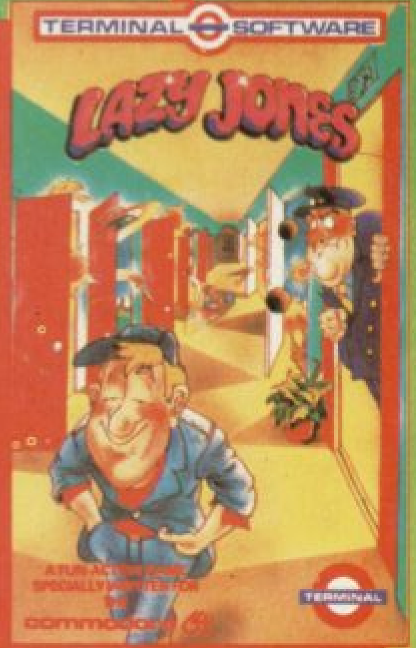


THIS WEEK	LAST WEEK	WEEKS IN CHART	TITLE Publisher	Computer	SPECTRUM	VIC 20	CMMDRE 64	ELECTRON	ATARI	DRAGON	ORIC	BBC	OTHER
					(Also Available on)								
1	1	4	DALEY THOMPSON'S DECATHLON OCEAN	SPECTRUM	●		●						
2	2	2	ELITE ACORNSOFT	BBC								●	
3	2	5	DALEY THOMPSON'S DECATHLON OCEAN	COMMODORE 64	●		●						
4	4	2	BEACH-HEAD ACCESS/U.S. GOLD	SPECTRUM	●		●						
5	7	4	MONTY MOLE GREMLIN GRAPHICS	SPECTRUM	●		●						
6	6	16	JET SET WILLY SOFTWARE PROJECTS	SPECTRUM	●		●						
7	5	2	SHERLOCK HOLMES MELBOURNE HOUSE	SPECTRUM	●								
★8		1	JET SET WILLY SOFTWARE PROJECTS	COMMODORE 64	●		●						
9	8	8	FULL THROTTLE MICROMEGA	SPECTRUM	●								

9	8	8	FULL THROTTLE MICROMEGA	SPECTRUM	●								
10	20	3	FRANK. N. STEIN P.S.S.	SPECTRUM	●								
11	17	2	CHILLER MASTERTRONIC	COMMODORE 64			●						
12	15	2	KOKOTONI WILF ELITE	SPECTRUM	●								
13	27	10	BEACH-HEAD ACCESS/U.S. GOLD	COMMODORE 64	●		●						
★14		1	DARK STAR DESIGN DESIGN	SPECTRUM	●								
15	12	10	LORDS OF MIDNIGHT BEYOND	SPECTRUM	●								
16	13	10	SABRE WULF ULTIMATE	SPECTRUM	●								
★17		1	HUNTERKILLER PROTEK	SPECTRUM	●								
18	21	9	TORNADO LOW LEVEL VORTEX	SPECTRUM	●								
★19		1	ZAXXON ACCESS/U.S. GOLD	COMMODORE 64			●						
20	11	3	DEATH STAR INTERCEPTOR SYSTEM 3	COMMODORE 64			●						
★21		1	QUO VADIS THE EDGE	COMMODORE 64			●						
22	23	2	CHESS PSION	SPECTRUM	●								
★23		1	DANGER MOUSE CREATIVE SPARKS	SPECTRUM	●								
24	16	2	CHEQUERED FLAG PSION	SPECTRUM	●								
★25		1	ALCATRAZ HARRY MASTERTRONIC	SPECTRUM	●								
★26		1	FALCON PATROL II VIRGIN	COMMODORE 64			●						
★27		1	HECTIC MASTERTRONIC	VIC 20		●							
28	19	4	MONTY MOLE GREMLIN GRAPHICS	COMMODORE 64	●		●						
★29		1	INTERNATIONAL SOCCER COMMODORE	COMMODORE 64			●						
★30		1	ARABIAN NIGHTS INTERCEPTOR MICROS	COMMODORE 64			●						



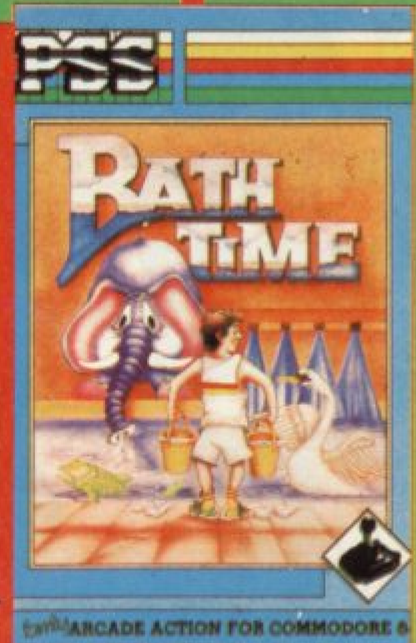






Look out for the brand new 'Top 10' in the Saturday edition of the DAILY MIRROR, every fortnight.
Plus the complete 'Top 30' in Computer & Video Games at your newsagent on the 16th of every month.
Information compiled by N.O.P. Market Research Ltd.

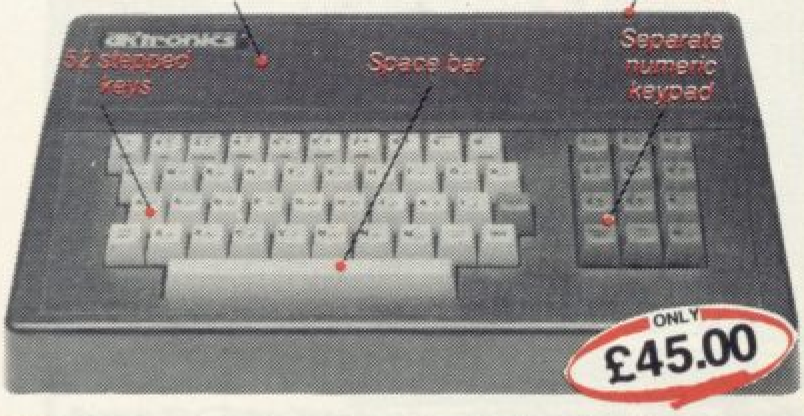






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It is supplied 9" in length and will allow male or female connections to be made to the computer.
The connector has special lugs to enable easy fitting/removal from the computer's expansion port.



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The Spectrum Connection



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by ZAKZ
CHRISTMAS MORNING....
THIS IS THE STORY OF A GREAT MAN, BUTCH.
A CHRISTMAS CAROL
INFERNAL RACKET! I'LL HAVE TO START ALL OVER AGAIN!
WHAAT...
BEWAARE SIR CLIVE OR YOU WILL SHARE OUR FATE!
SLYNX
SCARNELL
GRABBIT
LEDGER
LIKE TO BUY THE RIGHTS TO BANDERBOTCH?
MERSEY SLICKERS INC.
IT'S OVERWORK! NOBODY APPRECIATES THE PRESSURE OF BEING ME!
LATER THAT NIGHT...
ONE MORE PRE-CHRISTMAS BOOM AND I CAN GO MULTINATIONAL!
COMPUTERISED LIFT
HALL: ENTER
OFFICE: $
BED: CAPS SHIFT
WAIT TILL THE JAPS SEE MY FIFTH GENERATION MACHINES. I'LL BE BIGGER THAN IBM!
PRESS ANY KEY FOR MORE HOT WATER
I AM THE GHOST OF CHRISTMAS PAST! AWAKE SIR CLIVE!
THINK SILICON!
POEMS OF G.M.H
I TAUGHT MYSELF EVERYTHING!
YES, YOU WERE A REAL SWOT THEN.
MUM, HAVE YOU SEEN MY RE313/F ANYWHERE?
RADIO KIT
THOSE WERE THE DAYS!
THE WATCH DIDN'T WORK THOUGH DID IT?
CALL ME UNCLE!
PRESS
CLICK!
CLICK!
CLICK!
I SHOWED THOSE FACELESS BUREAUCRATS WHERE TO STICK THEIR MINUTES!
TECHNOLOGY FOR THE MASSES!
NO ENTRY FOR CLIVE
ZX81
NOW THE GHOST OF THE CHRISTMAS PRESENT APPEARS...
THOSE WERE THE DAYS!
COME AND SEE HOW THINGS ARE TODAY!


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MUMMY, IT DOESN'T WORK!
WELL SON, THEY PROMISED IT WOULD BE DELIVERED ON TIME!
SOB! SOB!
WAIL!
WHY BLAME ME? I'M NO WORSE THAN ANYONE ELSE. THINGS WILL BE BETTER IN THE FUTURE, I PROMISE!
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WHAT A LOVELY STORY! NOW LET'S PLAY THIS NEW GAME YOU BOUGHT ME BUTCH
SENTIMENTAL TWIT!
BANDERBOTCH
PRESS
AAAARGH!
THE MERSEY CURSE STRIKES AGAIN!
EXPLODE

It's eight in the evening. The weekly soap is about to start on the box. And you're in the middle of a program.

Either way, there's going to be trouble.

The new CPC464 gets round the problem very neatly.

It comes complete with its own colour monitor or green screen VDU. Yet it costs around half the price of a comparable home micro system.

That's not all. As well as the monitor, the CPC464 includes a built-in cassette data recorder, 64K of RAM (42K available), 32K of ROM, typewriter style keyboard and a very fast extended BASIC.

And it comes complete and ready-to-go. Just plug it in.

High resolution graphics. Stereo sound.

The quality of the graphics on the CPC464 screen beats the micro/domestic TV combination out of sight.

That's because our monitor drives each colour on the screen directly from the computer. Nothing gets in the way of the best possible picture. And you won't have tuning problems.

It sounds good, too. Especially when you feed the 3-voice, 7-octave stereo output through a hi-fi amplifier and speakers.

64K RAM.

With 64K of RAM there's plenty of room for sophisticated and complex programs.

Over 42K is available to users, thanks to the implementation of ROM overlay techniques.



Pound for pound, other micros simply can't match the CPC464's memory.

Amsoft. Exciting software range.

Arcade games, educational programs and business applications are all designed to utilise the CPC464's impressive graphics, sound and processing abilities.

A rapidly expanding range of programs is already available. High quality software that takes advantage of the CPC464's high specification and speed-loading capability. Which means even complex programs can be loaded quickly.



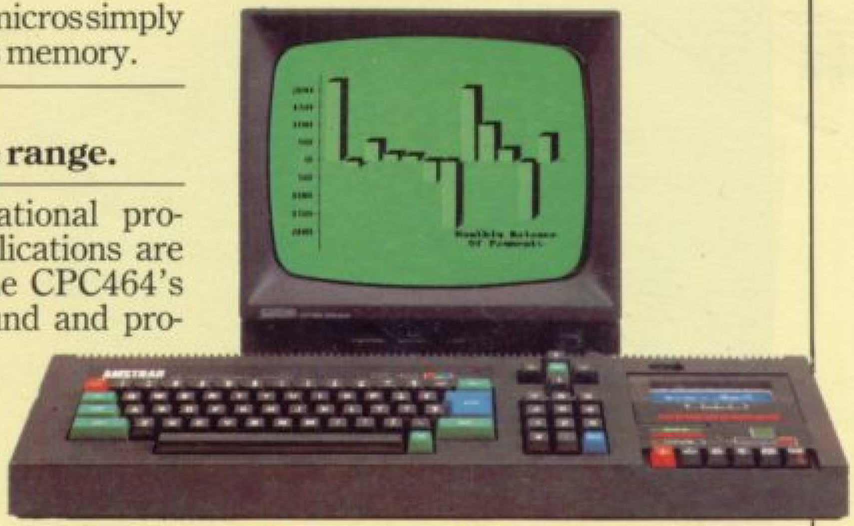
Amstrad. Join the Club.

The CPC464 User Club is run by Amsoft, our software division, which provides software, peripherals and publications for members.

As a member, you'll enjoy immediate benefits like the privilege card, Club binder, regular magazine, competitions for valuable prizes and contact with other Amstrad users.

Whether you're a games fanatic or interested in serious commercial applications, you'll want to join the Club.





CPC464 green screen VDU (GT64)

Green screen VDU.

Perfect for data management with high resolution screen, 80 column text display and up to 8 text windows.

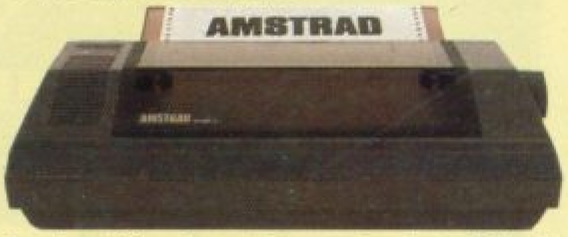
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Optional disk drive DDI-1 including interface CP/M* and LOGO £199.95



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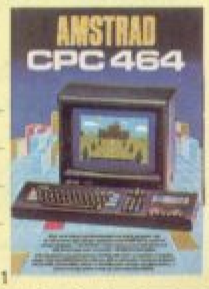
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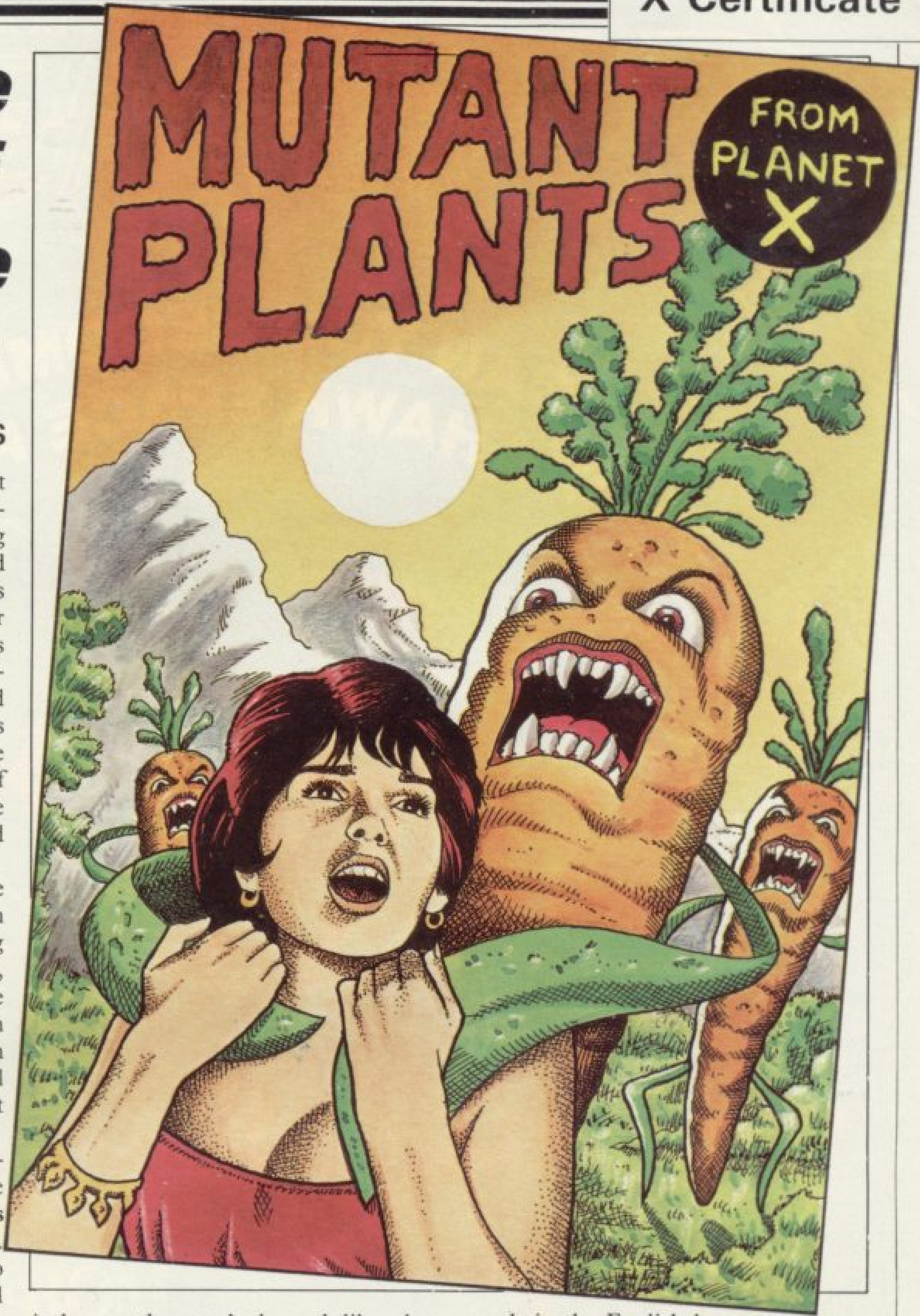
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A GAME OF INTRIGUE & SKILL IN THE OIL BUSINESS.

All in the name of the game

Anton Seedy gives some xtra tipz for uninspired programs



EVERY SINCLAIR USER must have read, again and again, articles on how to write a winning computer program and has waded through pages of useful tips on ideas and formatting. By now we all have our favourite machine code sub-routines together with the realisation that practically any game with a black background looks good. Just imagine how bilious and flat-looking games would be if space was cyan. Black has the illusion of depth, but not as much depth as the minds of those who write the blurbs and titles of the latest software.

As your average micro user, I have only realised recently what all my own programs have lacked. It is something that I have never read in any manual, book or magazine and now that I can see where I have been going wrong, I wish to share my new-found knowledge with others whose programs, like mine, will now take on a new dimension. The fact is, it is all in the title.

Firstly, no matter how good or exciting your own programs are, if you have called them **Plane Attack, Frog Hops** or **People from Space** then forget it. Names that clearly indicate what is to be expected are a no-no. Friends will not be inspired if you bubble with excitement over your latest software masterpiece and then they sit in front of a TV screen displaying the title, **Flower Identification.** No matter how swift the code or how smooth the superb graphics may be, the title will have the player reaching for the exit key in no time.

Now, if you had called it **Mutant Plants from Planet X** then that title would contain three important factors which would have anyone hooked, even before they had pressed the start key.

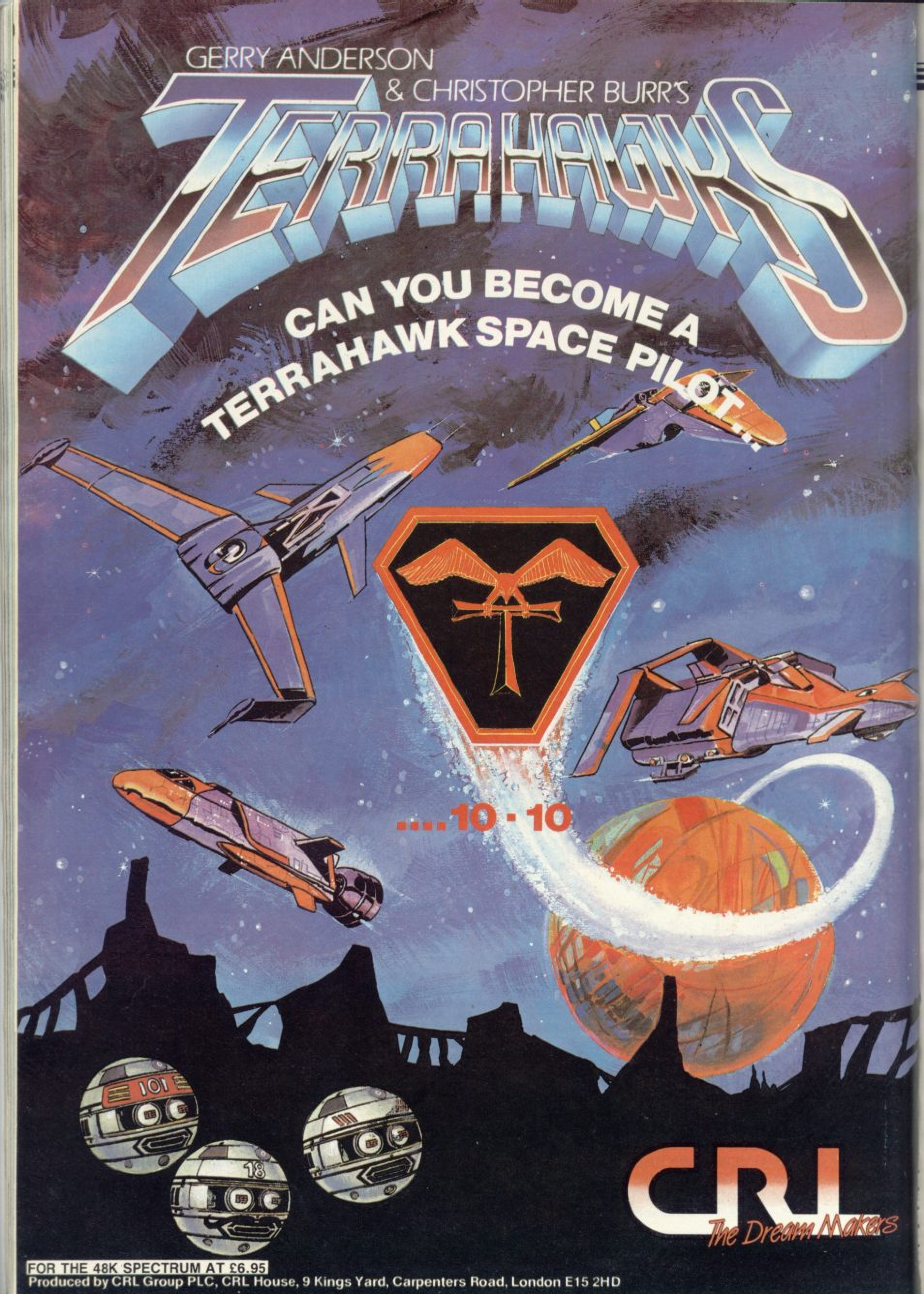
Let us examine those three factors. To begin with, the word Mutant. That is a godsend. Not only does it fill the mind with dread and a natural desire to destroy, but because an object is mutant it does not have to look much like what it was supposed to resemble in the first place. Nothing is more soul destroying than to have someone point at your hours-to-design sprite and say with mirth, "What's that supposed to be?" The word mutant opens players' minds to expect and accept any blob of colour that zips across the screen as quite possibly a mutant manifestation of whatever was in the title.

The word From. Simple logic tells us that if something is from somewhere then it obviously does not belong where it is now. That too will make the player want to send it back or destroy it. The word plays on people's natural prejudices and fear of the unknown.

The letter X. Considering how few words in the English language start or contain the letter X, or Z for that matter, it is nice to see those two previously under-used letters enjoying a renaissance. The motor trade would be lost without them, as the inclusion of the letter X in the name seems to go hand-in-hand with any production car that has the addition of a couple of spot lights and a thousand pounds. Whatever happened to GT?

Z and X seem to have a mystery surrounding them. What is it about them that has a whole range of computers in their grip? Put X or Z in a title, or both, and even the most mudane software gets looked at. Why has no-one marketed a game called **Mutant Zs**

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101
18
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continued from page 81

from X? The title alone would sell thousands.

Another secret ingredient for a good title is bad spelling, or a name which seems so impossible to pronounce that anyone seeing it spends the rest of the day thinking about how to say it. That will result in the program being bought out of sheer curiosity.

If a game idea is a direct lift from somewhere else, then a change of name is essential, and the more devious the better. What is the Latin for frog? Why frogs, even? Surely newts, fieldmice and hedgehogs have a need to travel. Hedgehoz. . . now there is an idea.

After you have settled on the title, you must next set the scene. Do not boldly state "When the question mark flashes across the screen, press any key to stop it, and check your reaction speed". Say something imaginative such as: "As you peer hopelessly into the utter blackness of outer space your blood runs cold when you consider the almost certain fate that awaits you. Out there are the creatures which will show no mercy towards your mortal life if by chance they should stumble upon your crippled Z7 Starblaster XXX Space Ship. Those Mutant Insectoid aliens from the far distant unknown galaxy Z have pursued you through countless battles, and now, battle-scarred and weary of the fight, you prepare to face the last and decisive encounter.

"At your fingertips, on the vast weapons console set before you, are the controls which operate your Space Lasers, Photon Cannon, and Insectoidcide Spray Guns. Yet your heart is filled with dread as the controls fail to respond to your efforts to rekindle a spark of life in the flight navigation and weapons system computer.

"Suddenly you remember that your tractor beam facility still functions. You wait until an alien comes into view so you can stop it in its quest to extinguish your own life force.

"Can you do it in time?. . . When a Mutant Insectoid flashes across the screen, press any key to stop it and check your reaction speed."

The game is just as puerile as before, but a little expanding of the truth makes it sound a whole lot more exciting, and a bit of imagination never hurt anyone.

How to relate boring program graphics to spectacular fanciful cassette covers without the use of mind-bending drugs, will be the subject of a future lesson.



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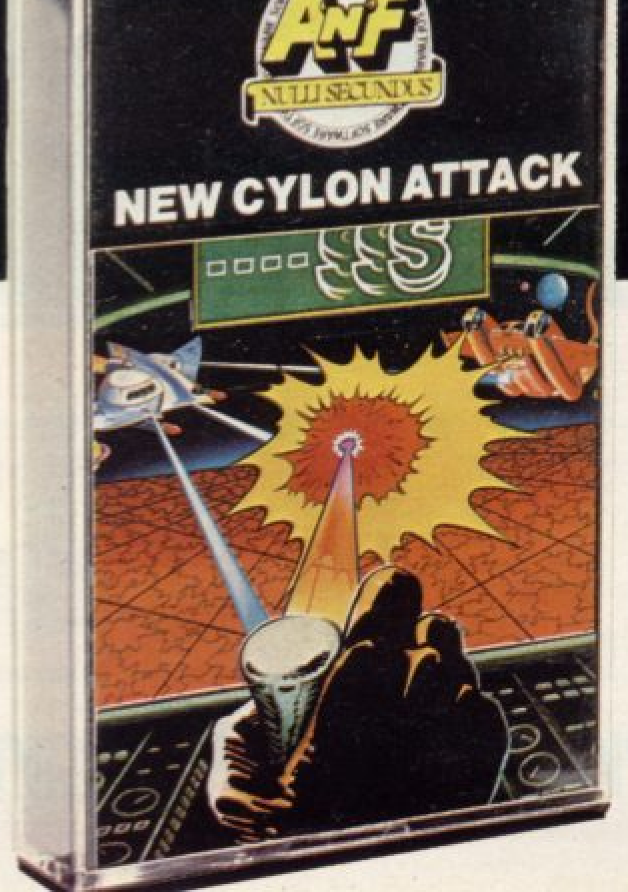
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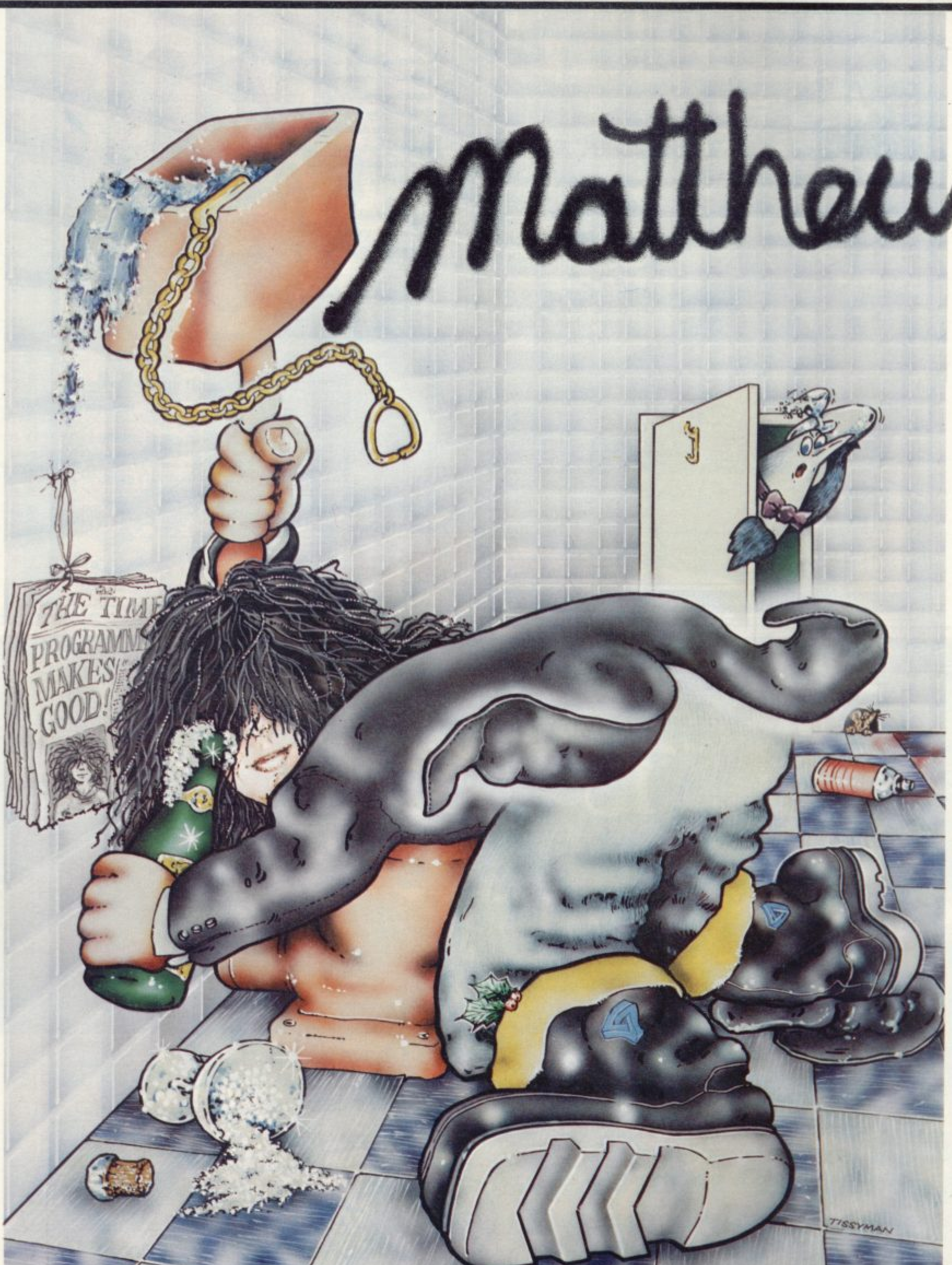
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Matthew
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uncaged

Matthew Smith struck gold with Manic Miner. Chris Bourne beards him in his jet-set pit.

THE RECEPTION area is stylish. Sofas which engulf anybody foolhardy enough to sit upon them. Muted prints of Parisian posters. A small pile of neatly stacked brown paper parcels. Clean carpets. No empty gin bottles.

Matthew Smith, the creator of **Manic Miner** and **Jet Set Willy,** seems light years away. All is order and calm. Where are the chaotic by-products of the mind which created the animated toilet seats, the pirouetting rabbits, the eternal off-licence or the kangaroo above The Vat. The madness is here, somewhere, beneath the surface. But where?

Alan Maton enters, tall and nervous, always in motion. He is the managing director of Software Projects, if such titles have meaning. His looks are faintly reminiscent of a youthful Jimmy Hill. He does not look like a managing director.

Inside his office, chaos begins to surface. It is the usual office chaos of overflowing desks and not enough ashtrays.

"It's not a smokeless zone" says Alan. "I don't think it's even a nuclear-free zone. There should be an ashtray somewhere."

Alan hunts for an ashtray. The coffee machine supplies a substitute in the form of a plastic cup. The coffee machine claims to be unable to produce coffee. "It's lying" says Alan. "How many sugars?"

Alan produces a cassette of Jet Set Willy for the Commodore 64, a new conversion of the program. The latest Software Projects cassettes are manufactured in blue plastic. "Nobody else does them" says Alan. "You have to get them ordered specially." The idea is to prevent piracy of the commercial sort which passes off duplicated cassettes under similar packaging to the original product. Alan rummages about for the finished product. Even the transparent section of tape at the beginning of the cassette has the magic words printed there. You may gather that Software Projects takes piracy seriously.

Alan's sense of humour becomes more overt as the conversation continues. Liverpool people are notorious for their sense of humour. It is a process of acclimatisation, of course. If reporters were directly confronted with Matthew Smith there might be trouble.

Eventually, Alan decides that the time has come. "Let's go and see if they've cleaned the straw out of Matthew's cage" he says.

Matthew Smith lives in the zoo, along with the seven other contract programmers employed by Software Projects. The zoo is an area of the building set aside for the programmers. It is not at all plush, quite unlike the reception area. To reach it you must climb a concrete staircase, and then wait for someone to unlock the door. Alan has a key, of course. The animals respect him.

If Alan is the Head Keeper, Matthew is the star exhibit, the money-spinner. He looks up from a conversation with two other inmates as Alan approaches. Alan explains about the interview.

'Do you want to do the interview?' asks Alan.

'No' says Matthew, tossing back his head and laughing, his long black hair rearranging itself to hang down in the new position. He doesn't really mean it.

Matthew was born in Penge, in Surrey, that butt of a hundred jokes about suburban life. When he was seven his family moved to Wallasey. He attended the local comprehensive, Mosslands on the Marsh. He learned nothing about computers, and left at sixteen.

His first computer was a Christmas present in 1979, when he was a mere stripling of twelve or thirteen. "It was a 4K TRS-80. I had been asking for one every day for six months, because I wanted to take it to bits to find out how it worked. I was very into electronics."

Truth to tell, he looks today as if he was once into electronics. His lank hair hangs down to his collarbone. He wears a white, evidently drip-dry, nylon shirt and indeterminate trousers. He has no socks, just a pair of heavy sandals. He is clearly a one-time electrician. Or an off-duty journalist.

"I didn't take it to bits because it already worked quite well," says Matthew. "I learned Level One Basic on it, which was no use for anything at all. I started learning machine code. It was tough. There were virtually no books at all, except a really heavy one by Rodney Zaks."

Having discovered the delights of Level One 'Useless' Basic he gave up writing arcade games. "It was two years before I got anything out of it. The first games were shoot-em-up games. That was what everybody played then."

The break came in a shop. The local Tandy shop played host to teenagers on a Saturday morning in those days, encouraging them to come in and program or play with the computers. It was fun for the kids, and good publicity for Tandy, who could demonstrate that 'even' children could program their machines.

"People say software houses in Liverpool are to do with unemployment," says Alan. "It's not true. It's to do with people. Like the Tandy store, and Micro-Digital, getting people in there hacking away. Without them there wouldn't have been much in the Liverpool area."

Liverpool is indeed a sort of Silicon Valley of software houses, with Software Projects, Bug-Byte, the now defunct Imagine, Voyager and even personnel from companies not based in Liverpool, such as Ocean Software. Hit

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Squad readers will be familiar with Steve Kelly, Chris Urquart and Mike Singleton, all Liverpudlians.

Matthew knew a friend who frequented the Tandy shop, Chris Cannon, now a Software Projects programmer. Chris Cannon knew Eugene Evans, who was writing programs for Bug-Byte. Eugene was later to become the star programme at Imagine.

"Chris managed to con one of the new-fangled Spectrums out of Bug-Byte," says Matthew who, unable to afford a Spectrum, asked for one on loan too and said he would write a game. He showed the company what he had done on the TRS 80 and was offered a freelance contract for three games. The first was **Styx.**

"Trouble was, I ran out of memory halfway through. It was only a 16K Spectrum. That's why there are lots of empty gaps in the game. It was a shoot-em-up game loosely based on Tutankhamun. I wrote it on the Tandy for the Spectrum, and wrote a routine to make a Spectrum read Tandy tapes. I kept dreaming of a disc drive."

Sick humour: "The animated toilet seats were my brother's idea. He was only three at the time."

Thus the Manic Miner legend was born. Alan Maton, then despatch manager for Bug-Byte, wanted a game similar in concept to **Donkey Kong,** which had been an enormous success in amusement arcades. Matthew suggested a game with eight or maybe even 16 screens. Such an arcade game had not been attempted before, not with fixed layout screens. "The name was Alan's," says Matthew. "Eugene said 'I don't think it will work,' which proves what he knows."

Matthew got to work on Manic Miner, using a Model III Tandy, with colour and sound. "I did 16 screens, and then worked out a way of adding another four. It was finished in August 1983." The game used core code routines for most of the basic action, but special routines were introduced for particular events on each screen. "It upset the people trying to do a conversion to another machine," says Matthew. "People working on the Solar Power Generator become sick."

Yes. Sick. Matthew's games are distinctive for their sense of humour.

"It started with a skit on Eugene Evans," says Matthew, reclining on his yellow foam mattress and smiling benevolently at the thought of Eugene. "The animated toilet seats were my little brother's idea. He wanted toilet seats in the game." Anthony Smith was three at the time.

Matthew's modesty is disturbing. Is that all there is to it, a few ideas borrowed from elsewhere? "No. I was fed up with little green monsters."

Alan decided to leave Bug Byte and set up on his own account. For six weeks he ran Acme, part of the Creative Technology Group set up by Imagine overlord Bruce Everiss. He still receives letters from lawyers as to who owned what and who was paid what. "I was only there for six weeks," moans Alan, plaintively.

Matthew also wanted to leave Bug Byte. According to him, there was a small matter of royalties owing. "I would have been quite happy to leave Manic Miner with them but they bent the contract," he says. Alan explains. "The royalties were to be paid for the duplication of cassettes, not their sale. The contract was only a few sentences. They were almost verbal agreements in those days."

"They ran up a huge debt," says Matthew. "It was £25,000 at one time. I kept asking for some of it. Whenever I called in they either fobbed me off or refused to see me. Eventually we agreed to cancel the agreement. I had sold Styx to them but they only had a licence to produce Manic Miner, which I cancelled."

Whatever the rights or wrongs of the business, and business in Liverpool certainly seems unnecessarily complicated, Smith joined up with Alan Maton and his wife Soo to found Software Projects. Liverpool entrepreneur Tommy Barton joined them and later Colin Stokes moved over from Imagine, following the notorious bugging incident in which his telephone was tapped.

Alan is anxious to dispel ideas that Liverpool is a sort of Silicon Dallas. "It's a very friendly industry. There are no hard feelings between me and Tony Badon at Bug Byte, for instance. As a matter of fact, we're having a meal together. We're good friends."

Matthew settles back and talks about Jet Set Willy. Jet Set Willy is said to be the biggest selling computer game in Britain.

Work on Jet Set Willy began even before Matthew had left Bug-Byte. He does not like giving away many of his programming secrets, but it will be a surprise to some to learn that the music, which plays continuously throughout the game, does not use an interrupt.

"The first instruction in the program is 'disable all interrupts' " he claims. "It's just move-a-tiny-little-bit, BEEP-a-tiny-little-bit. Have you noticed, the more lives you lose, the worse the music gets?" Few will have noticed. The music is unutterably disgusting anyway, a maniac, stunted version of *If I Were A Rich Man,* even worse than the original.

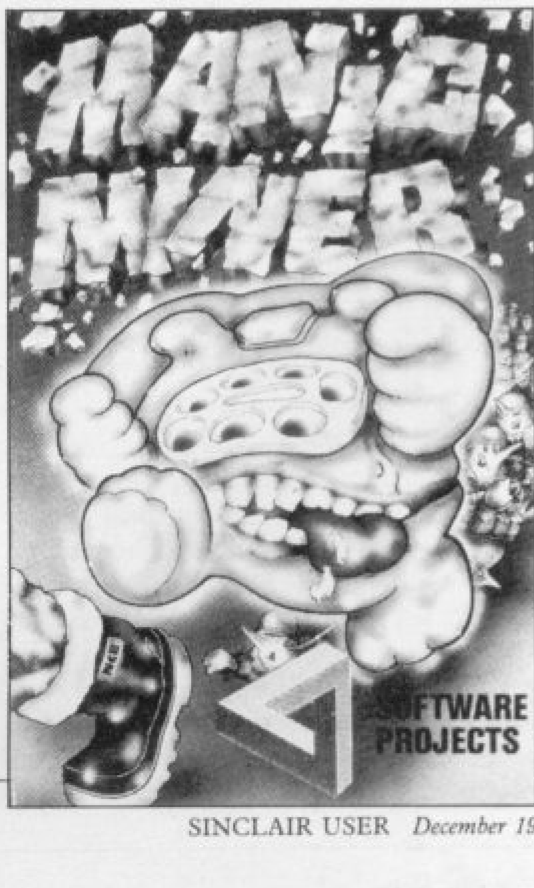
Bugs crept into the game, because of the pressure from distributors and retailers for the new game. That is the reason for the secrecy surrounding the third and final part of the trilogy.

Bugs include the double score for some of the objects and the major problem which relocates quantities of monsters after a player has passed through the Attic. Software Projects originally announced that this was a deliberate ploy to make the return journey through the house much more difficult. "Great, isn't it?" grins Alan. "There's no such thing as a bug in a game."

The humour became wilder. Some of the names for the rooms are obscure to the point of perversity. Was it true that 'We must perform a Quirkafleeg' derives from a cartoon in that comic beloved of hippies, *The Furry Freak Brothers?* "Yes" says Matthew. "I've been reading those comics for years, Furry Freak, and *Fat Freddy's Cat.* So does Alan."

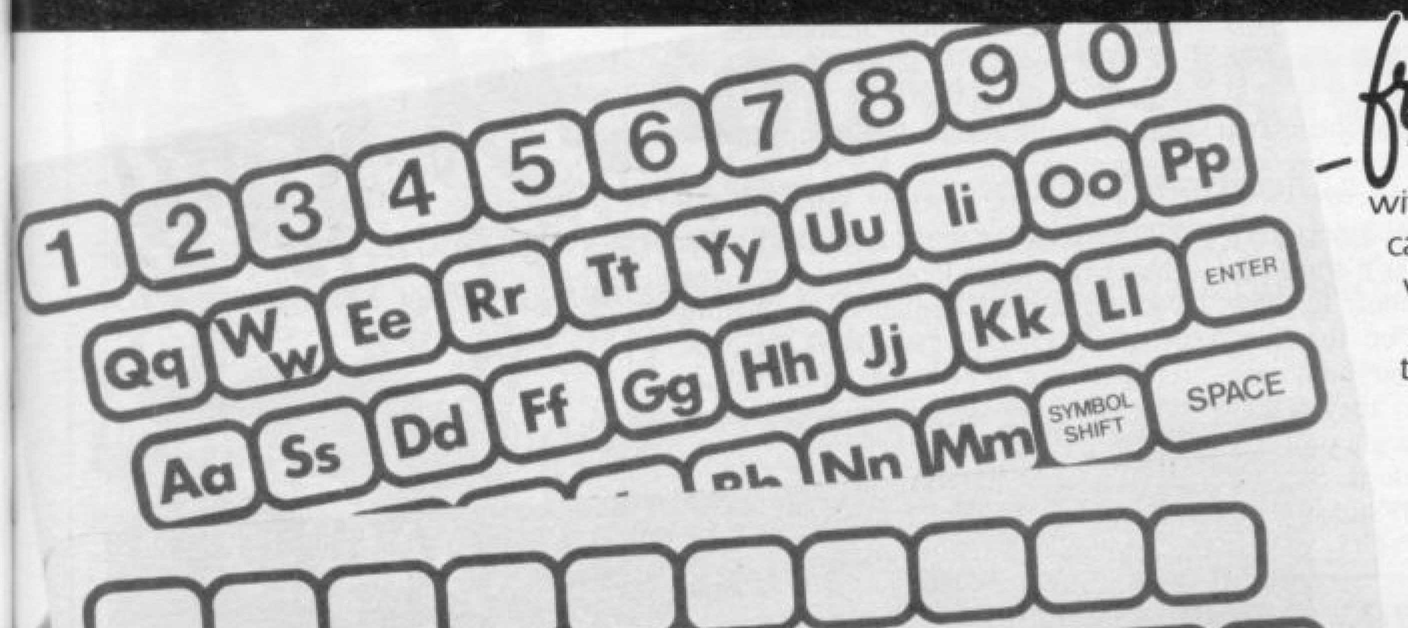
"You told me it was a Norwegian Folk Dance," says Alan, accusingly. He

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continued from page 90

does an impression of a massage from the Swedish Prime Minister.

It is indeed the zoo, and no matter how involved the conversation becomes one is inescapably drawn back to it. Some people never leave the zoo. Stuart Fotherington, a punkish leather'n'studs programmer, has not been home for days. "They know their job's on the line," says Alan. "People see everybody wandering around and think, they're idle. But as long as they produce a program, we don't care how they do it. Some of them sleep here. Come on, Stuart, when did you last go home?"

Atic Atac: "Closer to what Jet Set Willy should have been than Jet Set Willy as it is."

Stuart considers. "Saturday," he says, uncertainly. Today is Tuesday. "They've all got keys," says Alan. "I haven't got a key," says Matthew. "Well go and get one," says Alan. Matthew snorts.

Rumours abound that the next game is **Willy Meets the Taxman** with Willy forced to pay up for his Jet Set Willy lifestyle. No decisions have been taken, says Alan.

Certainly the new game will be based around the further exploits of Willy. Matthew wants to have a hardware-based game, involving some sort of extra ROM chip which could be used for programming applications as well as forming an integral part of the new game.

In the meantime the company is releasing a new game, **Lode Runner,** for the Spectrum. It will be another levels and ladders game but with the facility to design your own screens as well as use the ones provided. The graphics are clear but simple, with blocks to be collected and white ladders connecting layers of brickwork. Alan explains how wonderful the game is. It is being marketed under licence from Broederbond, an American software house which has had a great success with the game.

For most people, however, the success of Software Projects centres around Matthew and his unorthodox imagination. He is now the most famous programmer in the country, the embodiment of the otherwise spurious myth of the schoolboy millionaire.

What does it feel like to be a cult? "A what?" frowns Matthew. "Am I? You only become a star when people ask for your autograph."

"They do," Alan informs him. "They ask for signed posters." Matthew pretends to look puzzled. "I forge your signature," explains Alan, helpfully.

"I try not to be conscious of it" says Matthew, self-consciously, eyes glued to the table. "Stardom doesn't really appeal. Too much hassle. I happen to be doing something that sells well. Anything that is really interesting to do should make money."

Alan explains his ideal game is something like MUD, the Essex University Multi-User Dungeon in which many players can participate simultaneously and interact. Matthew says he thinks we are approaching the sort of game he would like to write. "It won't be written on the Spectrum first," he says. "We'll get someone to convert it."

Matthew's lifestyle is experimental. Alan says Matthew has discovered the sixties. "I don't do a lot" says Matthew. "Computing was my only hobby but I don't do that any more. I like partying, getting drunk and falling over a lot." He explains how he went to a nightclub recently dressed in a toga, 'as an experiment'. "Will they let you back again?" says Alan. "Not in a toga," says Matthew darkly.

Unlike many programmers, Matthew is still a fan of computer games. "If I had to be shut in a room with one Spectrum tape it would have to be **Atic Atac**" he says. "It's closer to what Jet Set Willy should have been than Jet Set Willy as it is."

Unusually, Matthew does not entirely approve of games, although he plays and makes a living from them. "I think it is harmful playing games — as well as writing them. Computers are going to have to stop giving out gamma radiation, keyboards have to go. Computers should be totally adaptable machines. I can see them being used — well, in a toothbrush, to keep the bristles at the right angle."

Matthew expands on his view of the future. "Things get hairy when we get machines which are more intelligent than us," he says. "I keep going on to Alan and Tommy when they are planning to take over the world. I want to lead a simple life. I think a lot of people do. The world can't sustain itself. The time comes when we can't all be comfortable and happy and warm and



fed. We have to blow ourselves up or find a way of being contented. There is not enough land. True communists are people who live in communes, villages, tribes. I'd like to live like that, but always with the communications we've got. There should be an end to cities. Cities should have walls around them to keep the city in."

Matthew contrasts himself with that other star programmer, Jeff Minter, whose Grid Wars series for Commodore machines rapidly achieved cult status.

"What I don't like about Minter games is they're not a simulation of any kind of real problem. I'm not into simulated violence. It's not really that much fun."

Minter claims Matthew's games are boring because there is a single route to success. "The single route doesn't present new problems," says Matthew, "but one fixed problem allows it to be a real scorcher. It's bad to encourage violence."

What about the foot that crushes Willy if he loses? Is that a violent image? "No" says Matthew, firmly. "The foot is comedy. Comedy is important to negate violence."

Matthew returns to his work, and we take our leave of the zoo. Alan telephones for a cab. The coffee machine produces one last cup of murky instant. Alan answers a call. "No," he says, "there's nobody here. You'll have to call again in the morning."

"I have to be my own security guard," he jokes, replacing the receiver. "Here's the cab. It should only take fifteen minutes to the station. Nice to have met you. Goodbye."

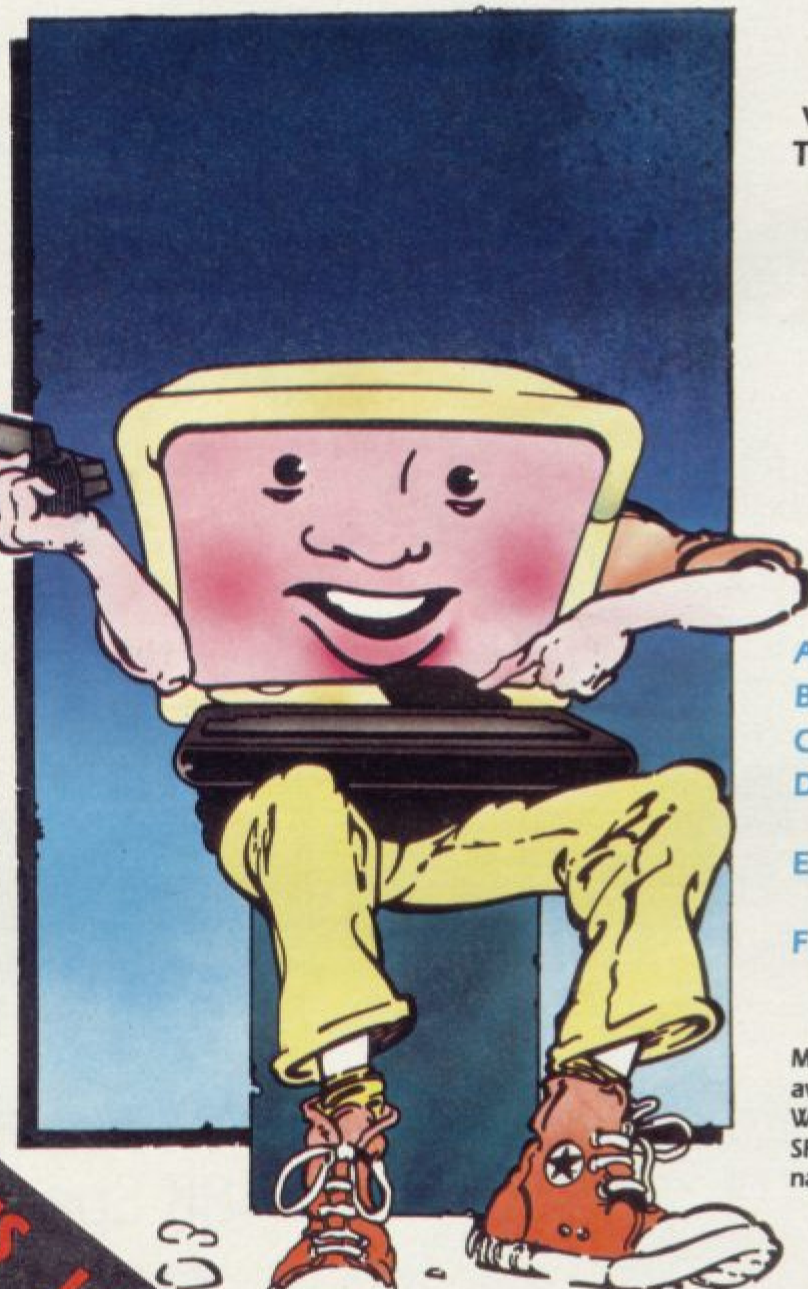
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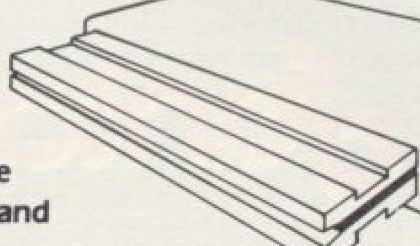


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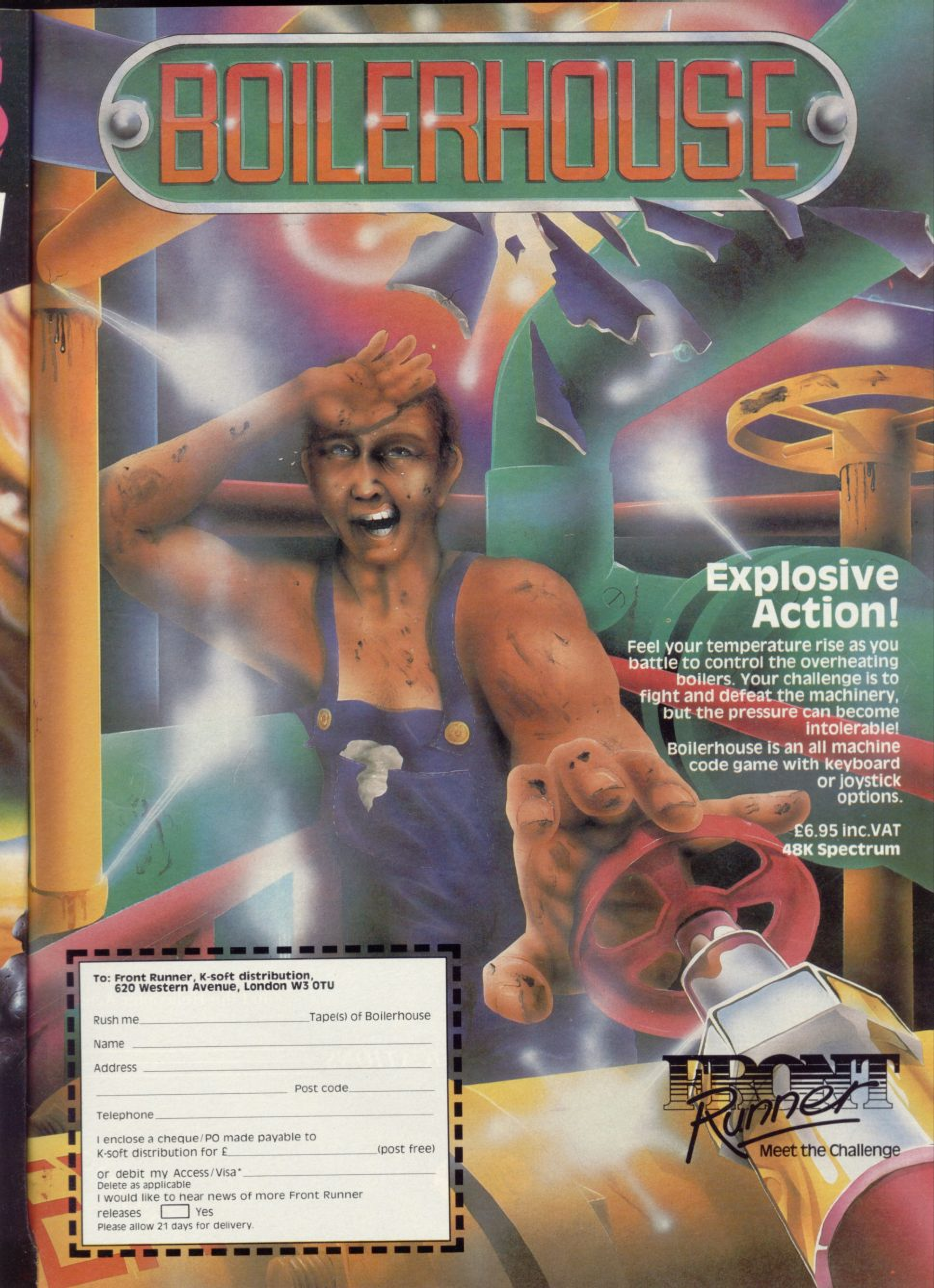
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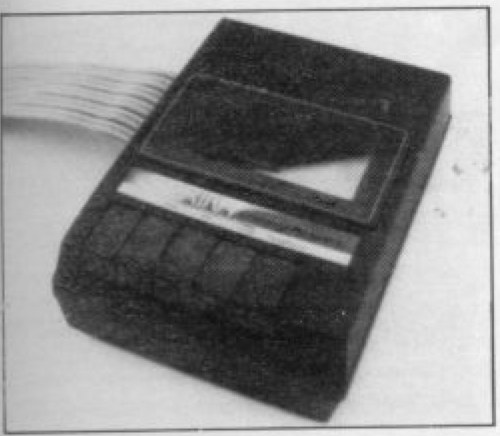
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Racing to the tape

Speed, economy or reliability? We take three of the fastest systems out on the track for a test drive.

IT IS NOW just over a year since the introduction of the microdrive, and in that time it has done more to inhibit the serious use of the Spectrum than any other add-on. Before you put pen to paper and write to us, an explanation is perhaps in order.

Users of the BBC, Commodore and other home computers expect to be able to add a fast storage medium — disc, hobbit and so on — to their computer and to be able to buy software in that format. There is an accepted format for both interfaces and recording medium and therefore software houses can develop programs knowing that they will be able to sell them.

The announcement of the microdrive, roughly a year before it actually saw the light of day, inhibited manufacturers from developing a standard, as Kempston had done with its joystick interface. The stories of unreliability, unfounded or not, also inhibited software houses as they could not ensure that any programs sold on cartridge would always work.

Finally, the price, scarcity and difficulty of duplicating microdrive cartridges gave few writers the confidence to market programs on cartridge. At the time of writing the number of programs available on cartridge can be counted on one hand, with a few more that are 'microdrive compatible', and none which were specially written for it other than copiers.

Despite that the microdrive is undoubtedly a remarkable device. It makes available a form of fast storage which many people would otherwise be unable to afford and, within limits, provides a usable system. It is only recently that it has been readily available and so perhaps now it will be accepted.

Because of those problems and delays, other manufacturers felt that they could do better and so there are now many other fast storage devices available, with more due to be released. While some are undoubtedly better, and more expensive, than the microdrive they all share one common problem, and that is that because there are so many different systems it is largely left to the user to convert software to run on them. With the ever present spectre of software piracy few software houses make their programs open to inspection and, due to the fact that most of the systems take up valuable memory space, some programs can not be converted even if you are able to break into them.

Your own programs, however, should be easily convertible; you are unlikely to write Basic programs in excess of 35-40K, and if you are able to write in machine code then you should be able to move it to an unused part of memory. The problem with commercial tapes is that the usual format is to have a Basic loader program which lowers RAMTOP and then loads a screen display followed by some machine code. It is the lowering of RAMTOP which causes the problems.

A BASIC program unusually starts at address 23755 — chapter 24 of the Spectrum manual suggests that you enter CLEAR 23800 (i.e. lower RAMTOP to that address) to see what happens when the computer runs out of memory. In order to be able to enter a short line of Basic you will need about 100-200 bytes of memory, so the minimum address to which you can usefully CLEAR is 24000, giving approximately 100 spare bytes. With the more popular commercial games it is quite common to CLEAR to 24000-25000 and so you can see that there is not much space left. With a program written for the 16K machine it is not uncommon to clear down to 23900. The simple answer is that the less memory the system takes the more programs you will be able to convert.

A good indication of that is the sector size. With microdrive and disc the data is held in blocks known as sectors. Those blocks are loaded into memory by the system one at a time and then moved to where they are required. For example, with microdrive the sectors are 512 bytes long, so you will need the operating system of about 100 bytes plus 512 for the sector and 83 to hold the additional channel information — say, 700 bytes spare or a minimum clear of 24700, more if you want to use two drives.

Another problem may be that of speed. Almost anything is quicker than cassette; a commercial 48K game takes about five minutes to load, but the method of storage will affect the speed. A microdrive uses a continuous loop of tape and so if the sector you want is next on the tape it will be very quick. If it has just passed that sector then the microdrive will have to go all the way round the tape, and so take longer.

A disc, however, normally stores the data in a number of concentric circles, known as tracks, and each track is divided into sectors. As the disc is spun very quickly those sectors are readily available. Overall, the time it takes to find a sector is largely determined by the time it takes to move from track to track.

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This can be as little as 3ms, 3/1000 ths of a second.

There is, finally, the problem of reliability. If you are writing your own programs or using the Spectrum for business then the system must be 100 percent reliable. That can only be judged with time and any comment on a new system can therefore only be an educated guess.

The first system looked at was the Challenge Sprint. That is a fairly new system and also the most straightforward. It is, simply, a normal cassette mechanism which has been converted to run the tape at four times the normal speed of 15/16 ips, (inches per second).

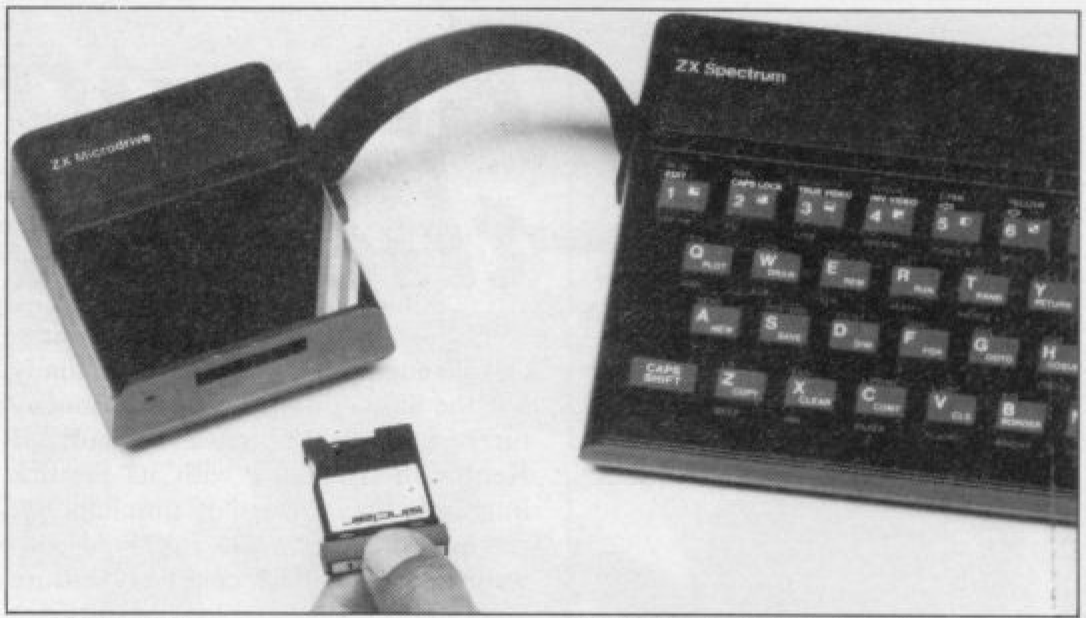
A flexible lead plugs into the back of the Spectrum and, on the back of the cassette, there is an extension port. It takes its power from the Spectrum. The Sprint recognises all the normal tape commands, whether used from Basic or code, and therefore is very simple to operate. To load a tape you use the usual LOAD "" command and press play.

The advantage of the system is that you do not have to convert any of your programs. The only programs which it would unable to load would be those which use their own, non-standard, loading routine such as **Halls of the Things,** or those where the time between the sections of program is very important.

The reduction in loading time is good; **Scrabble,** by Psion, which normally takes four minutes and 48 seconds to load, now takes only 1.16 minutes. Saving a straight 64K block took 1.15 minutes.

To have a means of measuring the speed of the different systems the following program has been used:

```
10 FOR n=1 TO 30
20 SAVE ("test"+STR$ n) CODE
32000,200
30 NEXT n
```



with line 20 changed as required. When saving with the Sprint it takes 2.36 minutes, and on loading 2.37 minutes.

The disadvantages of the system are largely the same as those at a normal cassette. You cannot control the cassette motor from software and so you cannot load selected programs without correctly positioning the tape by hand, or running through the whole tape. A note must be kept of the tape counter in order to find a program and, due to the speed, that must be very precise.

The cassette does not have any volume or tone controls and so when loading your own programs it is a case of all or nothing — if a program does not load then it is not going to. You cannot then try to load it using a normal cassette recorder without disconnecting the Sprint as it expects all tape commands to relate to itself. All the commercial tapes which were tested, however, loaded without problems.

The only other possible problem is the speed itself. Cassettes are not designed to be played at the speed at which the unit operates and so, despite having a good system which accelerates the tape to playing speed, when using Stop, Fast Forward or Rewind sudden speed changes occur and the tape is liable to stretching. The only way round that would be to only use those commands when you are certain that there is nothing on the tape at that point. It will Autostop from Play at the end of a tape.

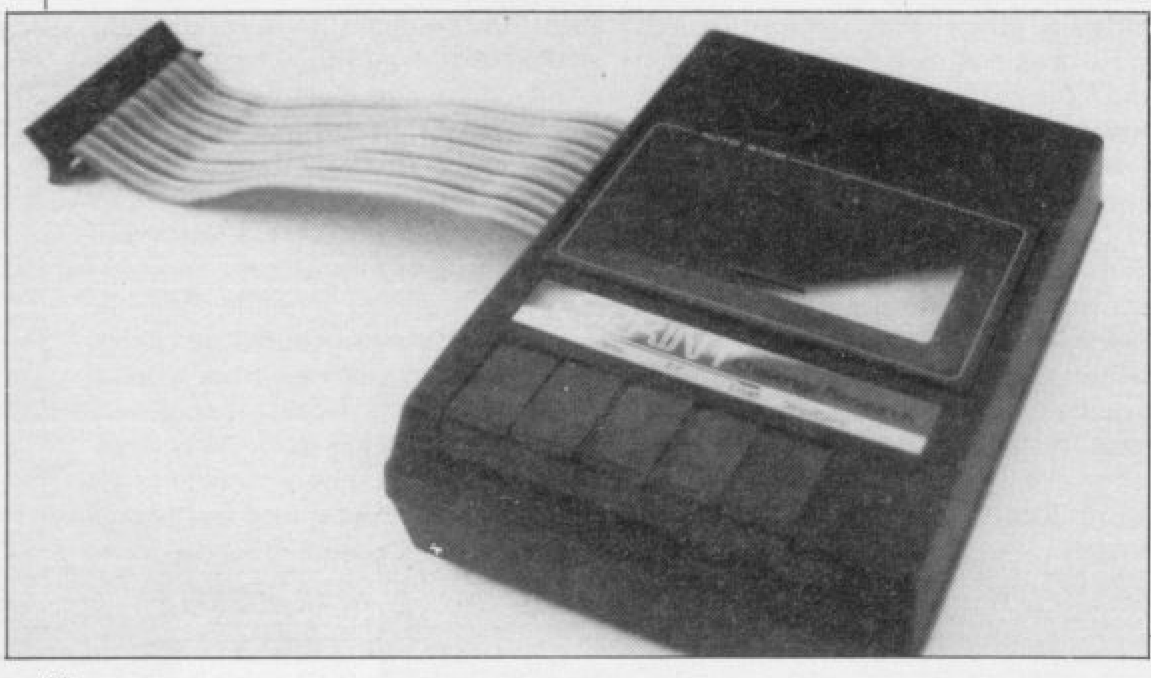
Surprisingly, some people want to use the Sprint with their microdrives. Early versions were not compatible with but that is now being corrected. When ordering it would be best to state if you intend to use it with a drive or not.

If all you want to do is load commercial tapes faster than normal and you do not want to worry about converting then this is the system for you. It is easy to use and provided the above points are remembered it should prove reliable.

The Sinclair microdrive has a number of good and bad points but it is the least expensive way of adding a fast storage/random access device to the Spectrum. Sinclair is selling currently a package of Interface 1, microdrive and four software packages for £99.95. The software is **Tasword II** and **Masterfile,** both of which are easily convertible anyway, and **Ant Attack** and **Games Designer** from Quicksilva. An introductory program and spare cartridge are also included.

The amount of space taken up by the operating system, and the increased length of the commands, have caused some users to experience difficulties in converting tape-based programs to run on it. Some games, such as **Jet Set Willy,** are easily convertible while others, such as **Sabre Wulf** or **Scrabble** present difficulties. In some cases it should be possible to modify the Basic loader program, either by standard memory saving techniques — such as

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using VAL or PI/PI to cut down the number of bytes used by numbers — or by loading the Basic in more than one part. If you are able to write your own machine code routines then a system of using the screen as a buffer, moving the Stack Pointer and then a block move will work in most cases.

Each of the cartridges can hold a minimum of 85K of data. That can sometimes be increased by repeatedly formatting it, each Format command taking 24 seconds.

Using the test program given above the microdrive takes 3.42 minutes to save and only 14 seconds to load. If, however, line 10 is changed to:

10 FOR n=30 TO 1 STEP −1

so that the sectors are not loaded in sequence, it takes 3.15 minutes. Erasing also takes quite a long time as a number of checks are made by the system when that is done. Using the test program with line 20 set to Erase it takes 3.46 minutes. Simpler commands are much quicker, a 64K block is saved in 18 seconds and CAT performs in only 7.5 seconds.

As well as the usual tape based commands for BASIC, CODE and DATA it is also possible to open files to the drive and send information to it. That can be very useful but it presents two problems. Every channel which is opened takes up memory and the data can only be accessed serially, so if you want the last piece of information on the file you have to Read all the way through it. That can be time consuming.

To run a microdrive you also need Interface 1. That gives you a RS232 port, useful for running a modem or printer and a network facility. Both are very useful additions but unfortunately most low-cost printers use Centronics rather than RS232 and the add-on kit for an Epson printer, for example, is in the region of £70. Moreover, while Spectrums can be networked there is some confusion as to whether or not the system will work with a QL, and if not that will mean additional software, on top of the 276 bytes used by the system.

Whether you love or hate the microdrive it cannot be ignored. If your pocket will not stretch any further then it is worth consideration, but bear in mind that it cannot be used on any other computer and so when you upgrade your system it will no longer be of any use. The manual supplied with it is not up to the usual high Sinclair standard, so you would do well to get one of the many books published about it. *Mastering Your ZX Microdrive,* by Andrew Pennel, Sunshine Books, or *Spectrum Microdrive Book* by Dr Ian Logan, Melbourne House, can both be recommended. The former contains many useful programs and a list of ROM bugs, the latter was written by the co-author of the ROM and contains a wealth of information.

The newest addition to the range of fast storage devices is the Wafadrive from Rotronics. That is an unashamed attempt to beat the microdrive in terms of the facilities it offers. For the price of £129.99 it offers two drives, Centronics and RS232 ports and, as an introductory offer, a word processing package, **Spectral Writer** by Softek, which in many ways rivals Tasword II.

On power up the Spectrum behaves as usual until the Wafadrive Operating System (WOS) is called. That is done by entering NEW *, at which point a copyright message is displayed and the system is ready to run. The syntax of the WOS has been well thought out, the normal Spectrum commands are used with the addition of the * to indicate the wafadrive rather than tape in the form:

SAVE *"test"

That applies to all the normal tape commands except DATA. CODE can be made to autorun with the addition of a third parameter. The save name is converted to upper case by the system.

A system of defaults is used so the above line would save to the default drive; if that was the A drive and you wanted to save to the B drive the command:

SAVE *"b:test"

would be used. The default drive can be easily changed using CAT #"b:".

Other useful features are LOAD *, which loads the first program on the wafer, ERASE *"te*" which will erase all programs starting with te and SAVE #"test" which will overwrite an existing program called test. That is useful when developing a program as usually any attempt to save using an existing name will cause an error to protect your programs from accidental erasure. CLS* will reset the ink, paper and border colours to the start up black and white.



It is not possible to save DATA in the usual way. A system of channels and streams, as used on the microdrive, are used with information being PRINTed to it and INPUT back; INKEY$ can also be used. MOVE is used to copy programs from one drive to the other. That will not work with programs which have been protected. FORMAT is used to format a new wafer and also to set the baud rate of the RS232 channel.

When the WOS is initialised it sets aside an area of memory for its own use. That contains a directory of both drives, a 1K buffer into which the sectors of data are loaded and space for the variables used by the system. That takes up 2292 bytes, each additional channel opened takes 1044 bytes and the Centronics interface a further 11 bytes. With so much space taken up, the number of commercial programs which can be easily converted is very small. Fortunately, Rotronics are working on filing and spreadsheet programs for business users and hope to be able to release games in the near future.

Wafers are available in three sizes — 16K, 64K and 128K — and the smaller the capacity the quicker the system will

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work. Each wafer contains a continuous loop of tape and is designed so that a metal tab protects the tape when the wafer is removed from the drive.

When testing the system for speed a 64K wafer was used, being middle of the range and most useful to 48K Spectrum owners. Formatting the wafer takes 2.10 minutes; 73 sectors are found, one used for the directory leaving 72K available for storage. A maximum of 32 files can be kept on a wafer due to the design of the directory.

Using the test program it takes 14.55 minutes to save, due to the tape doing one complete revolution per save. It also gives an out-of-screen error after 22 saves as the drive prints what it is saving on screen. Loading in sequence takes 14.30 minutes and 14.08 when using a STEP of −1; when erasing it also takes 14.08 minutes. If the wild-card facility is used, i.e. ERASE *"*" it only takes 29 seconds because the tape only has to make one revolution. It would therefore seem that with a 64K wafer the minimum LOAD/SAVE time is about 30 seconds; a 64K block takes 40 seconds to save.

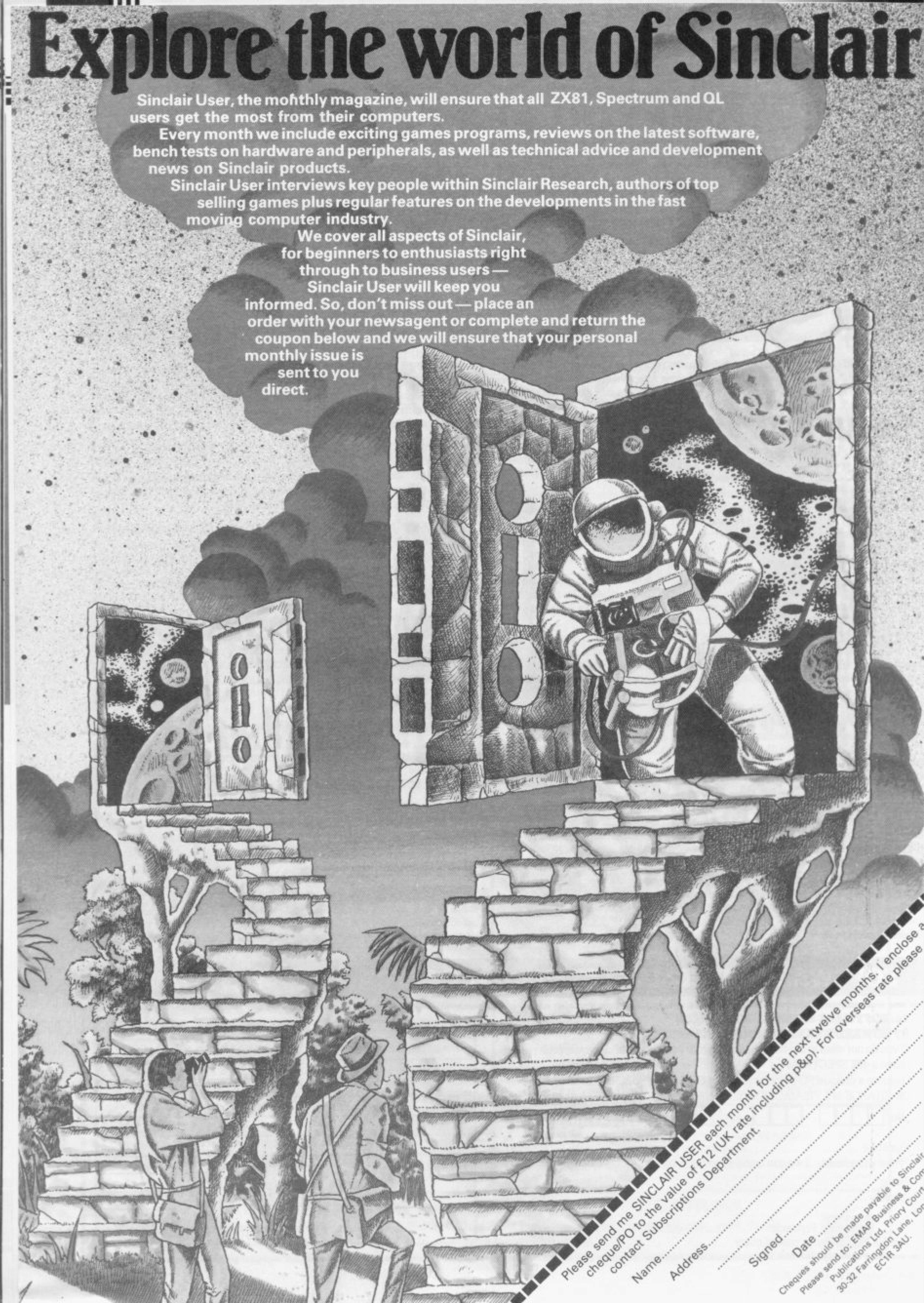
The manual supplied with the drive is well laid out and informative about the drives but lacking in respect of the ports. Apart from setting the baud rate it does not explain how to alter any parameters when printing. It appears that codes below 32 are not sent, other than 13 and/or 10 except by using CHR$, codes 32 to 164 are sent as normal and all tokens, codes 165 and above, are expanded. That is adequate for most simple printing but some modems require parity and stop bits to be set (or not) on RS232 signals and printers can use differing line feed settings.

Overall the system has much to offer, proving more reliable than microdrive due to the design of the wafers, but the memory usage is very high and its speed slow compared to other available systems. It will probably be popular with business users where reliability is paramount and the Spectral Writer program is a good indication of what can be achieved. It is very similar to Tasword II in operation, whose text files can be loaded directly, with additional features such as page headings and numbers. It is rather quicker although some of the features are not so convenient, it tends to work on the text file globally rather than by paragraphs and so when justifying the file you cannot do so selectively. It can give odd results, as is found when there are two words on a line at the end of a paragraph and the file is justified. The words are moved to the far left and right rather than both to the left margin.

Provided you do not want to convert your own programs or can use the machine code method of using the screen, and you are not worried by the lack of speed then the two drives and ports are very useful. If you use the MOVE command to make back-up copies of wafers be prepared though to take a long coffee break.

Next month we look at some of the floppy disc systems available for the Spectrum. Both 3in and 5 1/4in systems are now available including one which we shall be revealing exclusively and which will raise a few eyebrows. We will also include a table detailing the performance of all the drives now available.

Challenge Sprint, £69.95 from Challenge Research Ltd, 218 High Street, Potters Bar, Hertfordshire.
Sinclair Microdrive Expansion Pack, £99.95 from Sinclair Research, Stanhope Road, Camberley, Surrey.
Wafadrive, £129.99 from Rotronics, Santosh House, Marlborough Trading Estate, West Wycombe Road, High Wycombe, Buckinghamshire HP11 2LB.


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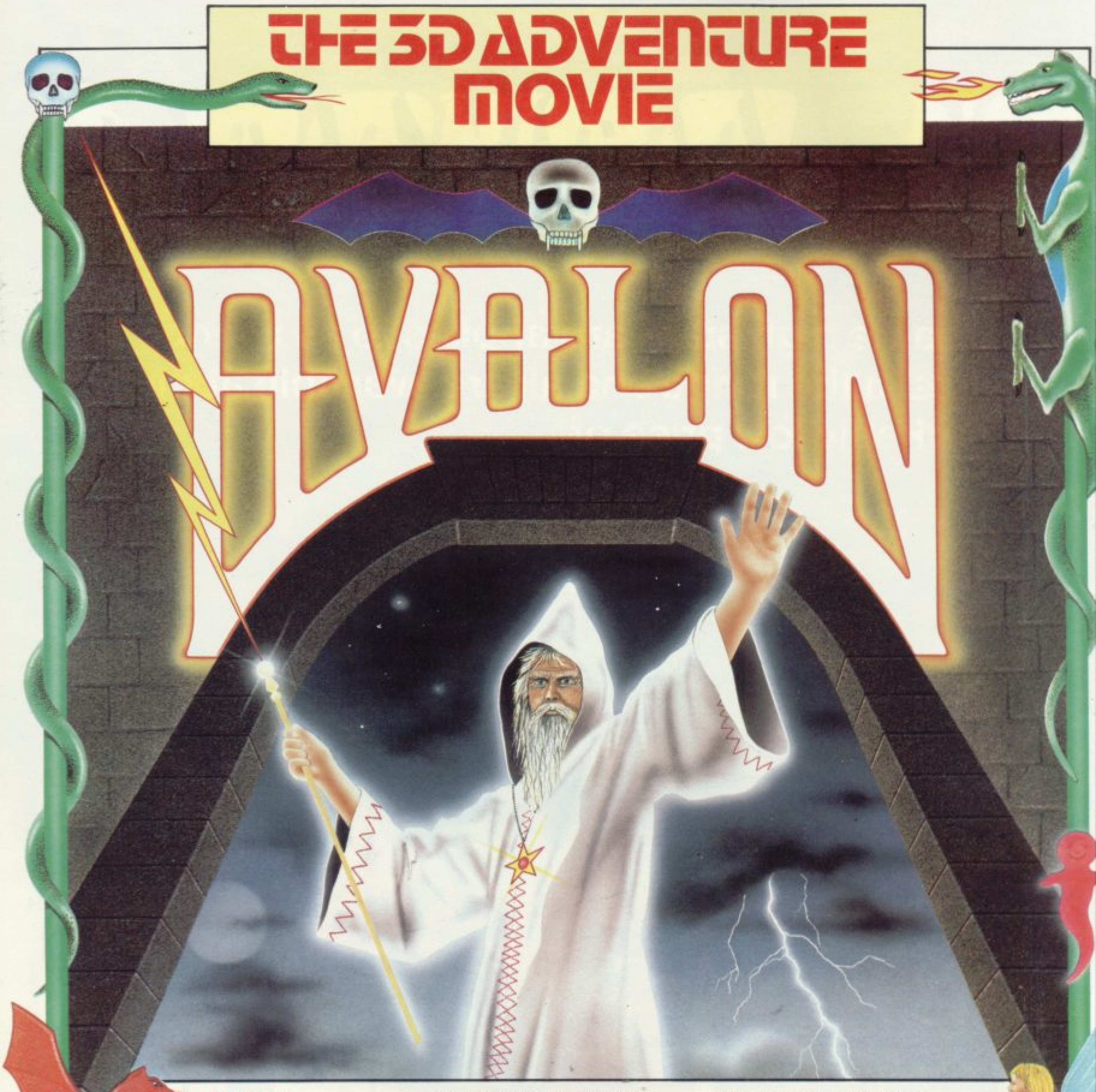
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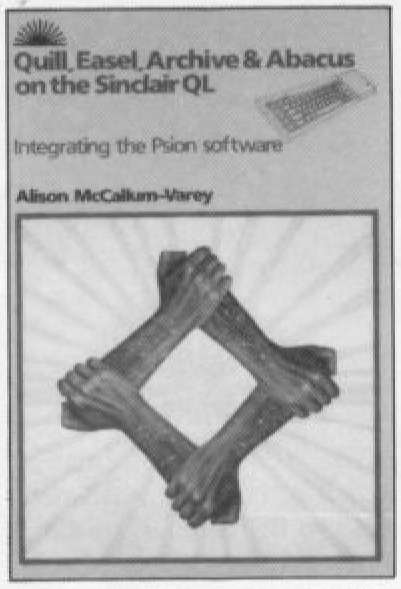
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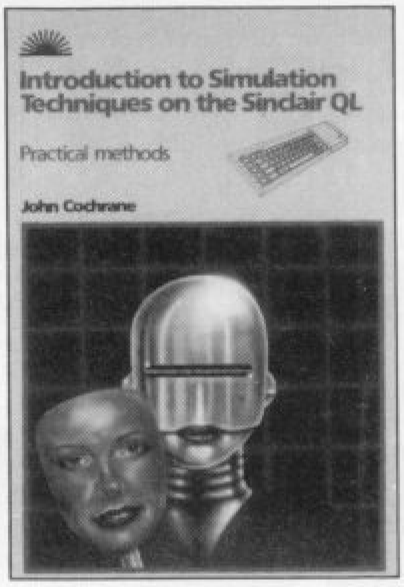
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Simulating life on the QL

TWO OF THE BEST books about the QL on the market have nothing to do with SuperBASIC, QDOS, or 68000 machine code programming.

The first, *Quill, Easel, Archive and Abacus on the Sinclair QL* is near to those topics but it goes one step beyond showing how each of the commands work for each of the packages. Instead it shows how each of them can be used with each other to create an environment in which complex business storage systems combine the graphics power of Easel, the word processing capabilies of Quill, the numeric brains of Abacus and the storage capacity of Archive.





The author, Alison McCallum-Varey has, in some places, made explanations and examples easier to understand than the Sinclair supplied manual and gives practical techniques for incorporating the software packages into any business. If any business person is not convinced about the power of the QL when they start to read the book they will be by the time they have finished.

Subtitled Integrating the Psion Software, the book is not split into separate sections, each giving an overview of one of the packages, but it does have a definite pattern which can be seen both while reading it and by studying the contents page. It almost shares the same pyramidal structure evident within the Psion software. You can follow the text at any level of understanding and skip over those parts which are not yet easily accessible without losing the thread of the author's argument.

The second book, *Introduction to Simulation Techniques on the Sinclair QL*, may seem a strange title to bring out for a relatively new machine.

John Cochrane, the author, presents the usually complex subject in a digestible, albeit unimaginative, style which most beginners should understand. He does not simply regurgitate all the general information which can be found about simulation and emulation techniques, and the advantages of the QL are heavily outlined.

The examples centre mainly around engineering but probability and so-called machine-exhibited intelligence is also covered.

Home and business simulations are included. At home Cochrane shows how to calculate and budget while at work future trends analysis can be done using the listings produced within the text. For those interested in developing their own techniques information is given on deteminism, the Markov Chain and the Monte Carlo technique. Those are backed with examples of use and a section on how to develop any simulation from scratch.

Both books from Sunshine Publications show what can be achieved when authors think about a machine and its capabilities before sitting down to write.

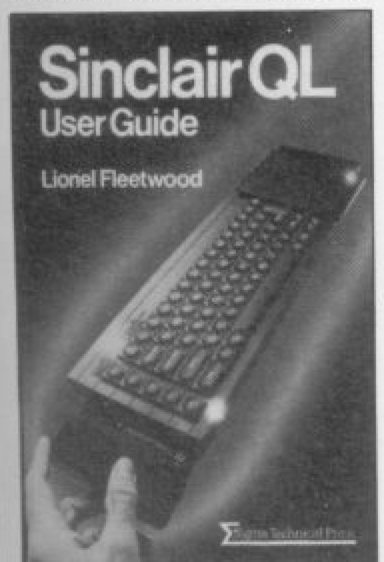
Quill, Easel, Archive and Abacus on the Sinclair QL — Integrating the Psion Software Price: **£6.95** **Introduction to Simulation Techniques on the Sinclair QL** Price: **£6.95**. Publisher: **Sunshine Publications**

more books on page 110

Case of the missing QDOS

ONE OF THE most sparse sources of information about the QL has just been provided by Sigma Press and it is called, more in desperation than hope you might think, *The Sinclair QL User Guide.*

The User Guide is just a rewrite of that other QL User Guide and looks as if the writer has dashed it off on a word processor and not bothered to add anything of his own, such personal opinions about how best to use the massive power of the new machine, or even a touch of humour. Most other books succeed in adding something new to the Sinclair Guide but Fleetwood's book does not.



Much of the book discusses the Psion software packages, twenty pages being left for a quick cut and thrust at SuperBasic which barely covers the points made in the beginner's section of the Sinclair Guide. You might think that the rest of the text would contain a wealth of information, culled from the corridors of Psion or Sinclair, about the software packages but you would be sadly wrong. There is one example for each of the packages and each of those covers barely one page.

The author and publisher do not seem to have measured their limitations in getting such a book out onto the market. Copies have been going out to WH Smith with bits of paper stuck over part of the blurb on the back of the book. For those interested in the offending passage, it reads "Bits and bytes don't come into it until you get to the technical section on the 68010 processor, the Motorola instruction set and the QDOS operating system. Even here, the language is clear and jargon-free, providing a painless introduction for those who want it." Yes, the introduction to QDOS is painless as it does not exist.

It is a pity to witness the birth of a book such as *The Sinclair QL User Guide.* It could have been so much better. Authors can make mistakes but the criticisms of this book are that nothing new, not even in terms of style, is brought to the reader.

The Sinclair QL Users Guide Price **£7.50** Publisher: **Sigma Press**

Even wimps can be wise

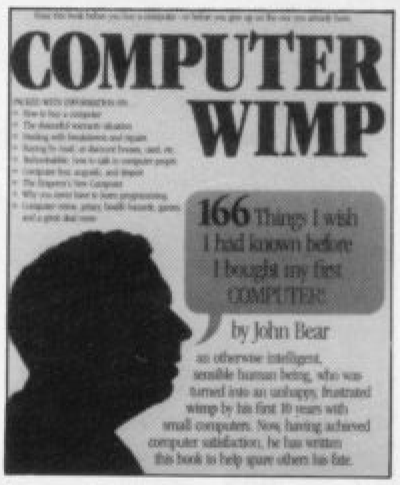
IF YOU WANT to know what you should have known before you went out and bought your computer then *Computer Wimp*, by John Bear, is for you.

Although it is an American import the book has more than a slight bearing on the British scene with its list of "166 things I wish I had known before I bought my first computer!" Each item is shown in bold type in the margin. The main body of the text, opposite the numbered item, explains the various factors involved in the solution of any problems which might arise from it.

The problems include buying a computer, operating the machine and dealing with any difficulties that may arise from its use. Each of the points is clear and concise in its terminology but hints of the author's irreverent attitude towards the computer scene peep through on nearly every page.

The text is peppered with Victorian and Edwardian engravings suitably doctored for at least minimal relevance. African porters shoulder printers and camel-borne Tuaregs carry PCs, to illustrate computer mobility. You will either love or hate this, but there is no denying that it is an extremely cheap method of illustrating a book.

As a reference book *Computer Wimp* is useful and amusing. It has some drawbacks, for instance all the prices are in dollars and not in sterling, but these are easily forgotten when you look at



all the practical information which can serve both American and British markets alike. The publishers make no apologies for the American bias, explaining that to change the text would be "to alter the flavour without adding anything to the quality."

Computer Wimp; Price: **£6.95;** Publisher: **Hutchinson**

Worthless enquiries

THE SPECTRUM version of Micro Enquirer rewritten from old *Computer Answers* articles, contains aspects of computing which have nothing to do with the Sinclair machine and will be of little interest to Spectrum users'.

It is a cheap way of running off titles and the joins show. About ten percent of the information contained within its pages is about the home computer market, the rest being specialist and business sectors.

Any Sinclair owners curious about CAD, CP/M, MODULA-2, MS-DOS, MSX and UNIX may find something of interest, but they should pay no attention to the blurb on the cover which proclaims "This book will answer all your questions about your Spectrum . . .". There is no mention of microdrives or the Interface 1, only a fleeting reference to joysticks and even the photographs are of hardware for other machines.

The Micro Enquirer: Spectrum Price: **£8.95** Publisher: **Century Communications**

Calling all modem users

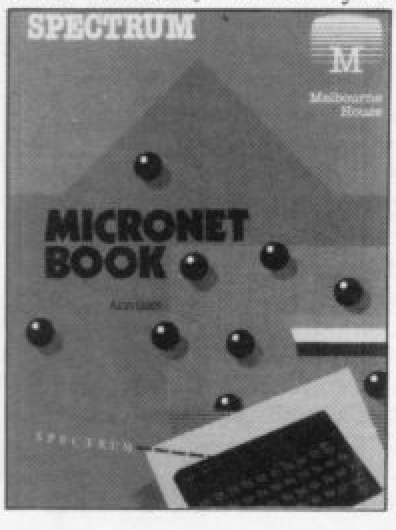
IF YOU HAVE ever had the urge to buy a modem and plug into Micronet, or want to know about getting around the network, then *Micronet Book*, by Alan Giles, is for you.

A complete rundown of the modem hardware and what you need to run it is given first, followed by an introduction to the Prestel databases and how to go through them to the Micronet information and telesoftware systems.

One of the most useful aspects of the book is how to convert functions of the VTX 5000 modem, which you need to make your Spectrum compatible with Prestel codes, in order that they work with Interface One and microdrives. That means screen pages of information can be downloaded from the system onto microdrive. Those screens can then be called up quickly without having to wade through reams of paper or find a particular screen on cassette tape.

Micronet Book, from Melbourne House, is a novel idea which has been well executed. A lot of information has been packed into such a small volume and no Micronet user should be without it.

Micronet Book Price: **£6.95.** Publisher: **Melbourne House**



Support you local Spectrum

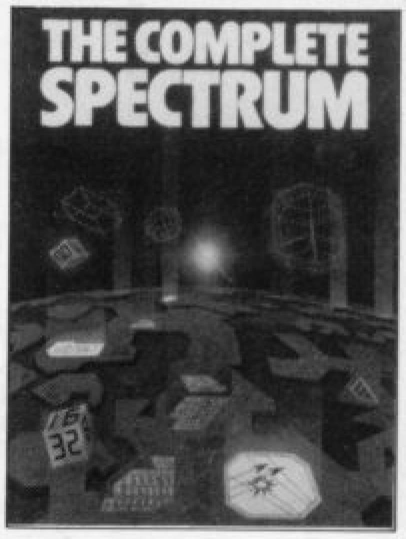
YOU WILL GET a lot of information if you buy *The Complete Spectrum*, published by Granada and edited by Allan Scott, a conglomeration of articles by authors such as Ian Sinclair, Mike James, and S M Gee.

The seven sections include information about setting up the computer, Basic and machine code, writing games programs and getting the most from peripherals.

Not satisfied with producing information about all aspects of the machine the publisher and editor have made it easy for the reader to find any information which is needed from hardware and software suppliers. An appendix listing most Sinclair supporting companies is a boon to any reader who might come across a reference to such companies in a magazine which then omits to mention its address. The software appendix even lists some of the most famous games on the market.

For a paltry £10.00 The Complete Spectrum is excellent value for money. One word of warning, though, to people who have bought any other Granada books on computers. Much of what is in the compilation has been culled from those books so beware. There had to be a catch somewhere.

The Complete Spectrum Price: **£9.95** Publisher: **Granada**





How to teach your Micro a thing or two

Thousands of home computer owners have yet to discover their microcomputer's potential to help with many of the problems and decisions that come up every day in the home or office.

Perhaps you have always promised yourself that you would teach yourself programming, but have been put off by manuals which seem to assume a lifetime spent studying computer science and mathematics. Maybe you have looked at other computer books, but have yet to find one which is free of unnecessary jargon or where the program examples bear some relevance to real life and not space invaders.

Relax, your search is over.

The 'Learn BASIC' tutorials from Logic 3 are the latest development of a teaching method pioneered by Professor Andrew Colin and perfected by testing on 3 generations of students at Strathclyde University. The 'Strathclyde Method' has been translated into 8 languages and used by over 300,000 microcomputer users.

'Learn BASIC' is a jargon free, step by step, course in computer programming, which explains everything clearly in English, not computer talk. In a matter of hours you will be writing your first programs.

'Learn BASIC' is designed for people who want to keep abreast of the computer age, for people who realise that understanding computers is a key to future success at work, at school, and as a parent.

Get 'Learn BASIC' and teach your micro how to be useful! (Available from major branches of W.H.Smiths, Boots, Laskys, Greens, John Menzies and better computer shops nationwide.)

Please send me more information about your:- (Tick appropriate box)

- 'Learn BASIC' tutorials ☐
- Logic 3 Spectrum Club ☐
- Logic 3 Commodore Club (64 and VIC owners only) ☐

I have a:-

- Sinclair Spectrum ☐
- Commodore 64 ☐
- Acorn Electron ☐
- BBC Microcomputer ☐
- Dragon ☐

Name ....
(BLOCK CAPITALS PLEASE)

....

....

Address ....

....

.... (Postcode) ....

SU1

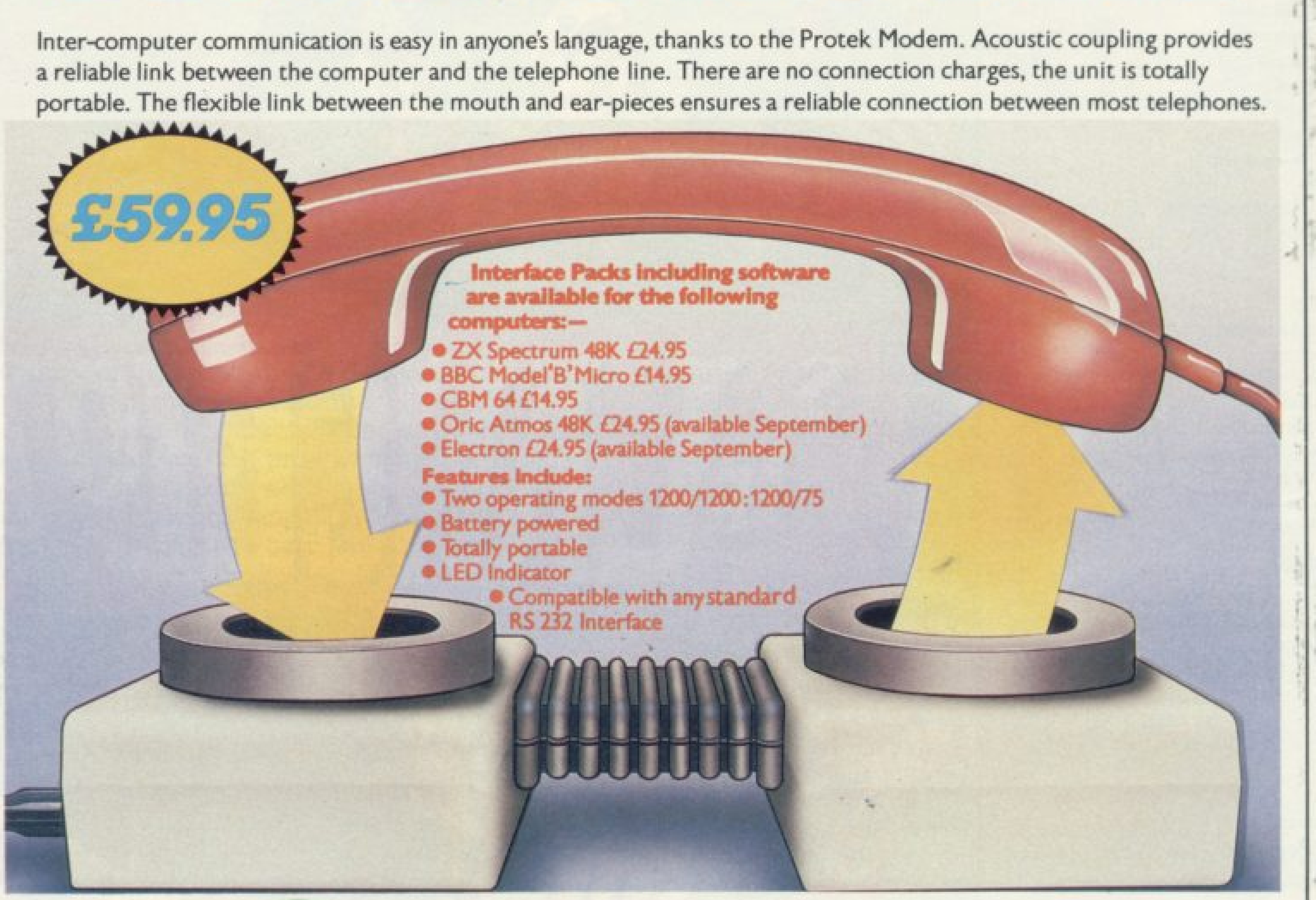
LOGIC 3

To Logic 3 Ltd., FREEPOST, Mountbatten House, Victoria Street, Windsor SL4 1HE

MODEM.

HIGH-SPEED COMPUTER TALK FROM PROTEK

Inter-computer communication is easy in anyone's language, thanks to the Protek Modem. Acoustic coupling provides a reliable link between the computer and the telephone line. There are no connection charges, the unit is totally portable. The flexible link between the mouth and ear-pieces ensures a reliable connection between most telephones.



APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

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PROGRAM PRINTOUT

GRAPHICS INSTRUCTIONS

Instructions for graphics characters are printed in lower-case letters in our listings. They are enclosed by brackets and separated by colons to distinguish them and the brackets and colons should not be entered.

Inverse characters are represented by the letter "i" and graphics characters by "g". Thus an inverse W would be represented by "iw", a graphics W by "gw", and an inverse graphics W by "igw".

Spaces are represented by "sp" and inverse spaces by "isp". Whenever any character is to be used more than once, the number of times it is to be used is shown before it, together with a multiplication sign. Thus "6*isp" means six inverse spaces and "(g4:4*i4:g3)" would be entered as a graphic four, followed by an inverse four repeated four times, followed by a graphics three.

Where whole words are to be written in inverse letters they appear in the listings as lower-case letters. Letters to be entered in graphics mode on the Spectrum are underlined.

Inverse characters may be entered on the ZX-81 by changing to graphics mode and then typing the appropriate characters and on the Spectrum by changing to inverse video and typing the appropriate letters. Graphics characters may be entered on the ZX-81 by changing to graphics mode and then pressing symbol shift while the appropriate characters are entered. On the Spectrum graphics characters may be obtained by changing to graphics mode and then pressing the appropriate character. User-defined graphics will appear as normal letters until the program has been RUN.

NIM



OUR FIRST game for the QL is that old favourite **Nim,** programmed by Arthur Douglass of London. The QL displays five rows of blocks, and you may take any number of blocks from a single row. The winner is the player who takes the last block.

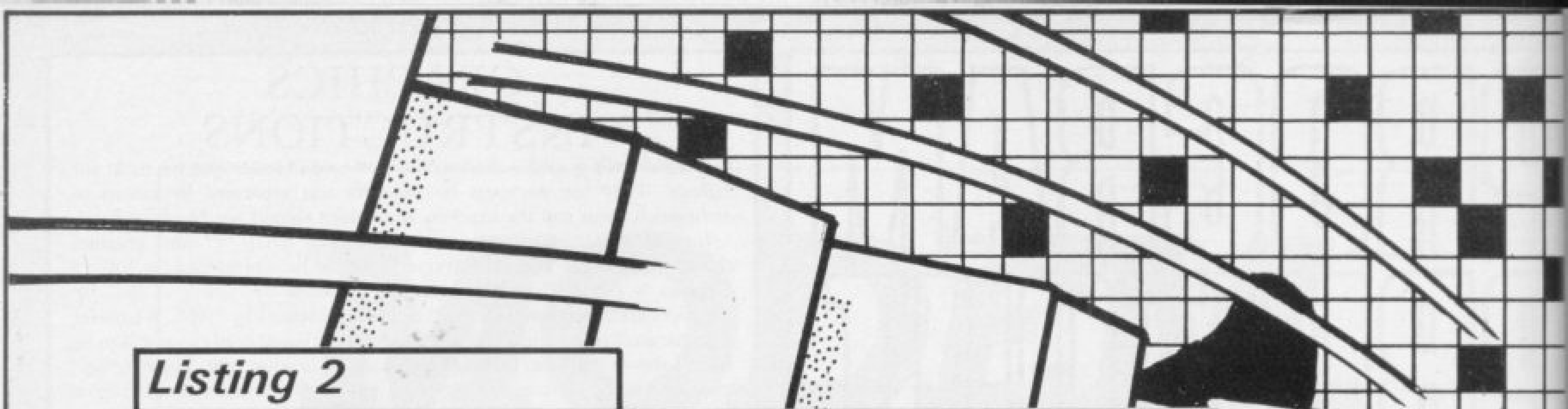
The program is in two listings. Listing One should be saved using: save mdv1_BOOT and Listing Two should be saved using: save mdv1_NIM. Nim uses several simple procedures which may be of use to novice programmers, including one to centre text on the screen and another to halt the program until ENTER is pressed.

The program uses our special abbreviations for graphics characters, so please read the instructions on this page before entering the program.

Listing 1

```
100 MODE 8
110 WINDOW 512,256,0,0
120 PAPER 2:INK 7:BORDER 2,2,7:CLS
220 FOR j=1 TO 7:centre "(sp)"
230 centre "PRESS ENTER"
240 wait
250 CLS
260 PRINT\\\
270 centre "RULES OF NIM"
280 PRINT
290 centre "The QL will display five rows of"
300 centre "from one to fifteen blocks."
310 PRINT
320 centre "The player and the QL alternately"
330 centre "take away any amount upto all the"
340 centre "blocks in any row."
350 PRINT
360 centre "The winner is the one to take away"
370 centre "the last block(s)."
380 PRINT\\\\\\
390 centre "PRESS ENTER"
400 wait
410 CLS:PRINT\\\
420 centre "The QL does not play a perfect game,"
430 centre "it would be boring if it did, but it"
440 centre "plays a reasonable game."
450 PRINT
500 PRINT\\\\\
510 centre "PRESS ENTER TO LOAD NIM"
520 wait
530 CLS
540 LRUN mdv1_NIM
550 DEFine PROCedure centre (a$)
560 LOCal j,k
570 j=42-LEN(a$)
580 FOR k=1 TO INT(j/2)
590 a$="(sp)" & a$
600 NEXT k
610 PRINT a$
620 RETurn
630 DEFine PROCedure wait
640 key=CODE(INKEY$(-1)):IF key<>10 THEN GO TO 640
650 END DEFine
```

continued on page 116



Listing 2

continued from page 115

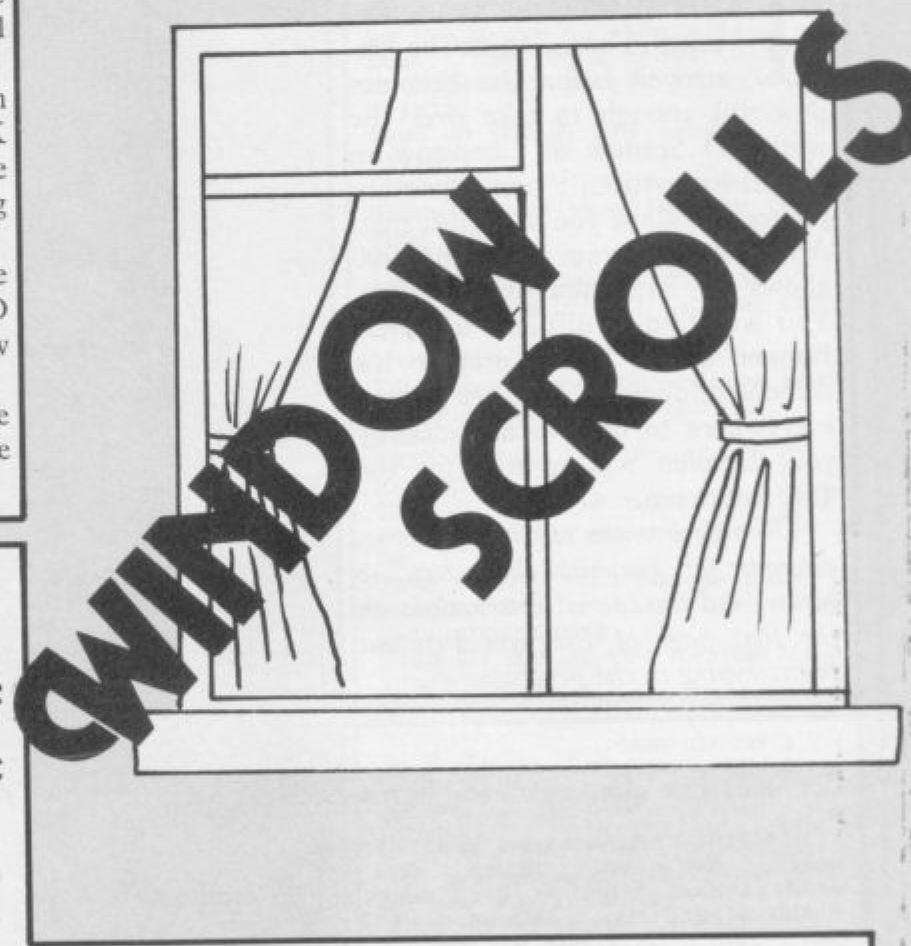
```
100 DIM nim(5)
110 MODE 8
120 WINDOW 512,256,0,0
130 PAPER 0:INK 7:CLS
140 WINDOW 448,190,32,16
150 OPEN#3,con_448x12a32x16
160 pscore=0:qlscore=0
170 FOR j=1 TO 5:nim(j)=RND(1 TO 15)
180 display
190 REPeat loop
200 player
210 display
220 CLS#0:IF NOT nim(1)AND NOT nim(2)AND NOT nim(3)AND NOT nim(4)AND NOT nim(5)THEN FLASH 0,1:centre 0,"You win":FLASH#0,0:pscore=pscore+1:replay
230 ql
240 display
250 CLS#0:IF NOT nim(1)AND NOT nim(2)AND NOT nim(3)AND NOT nim(4)AND NOT nim(5)THEN FLASH#0,1:centre 0,"I win":FLASH#0,0:qlscore=qlscore+1:replay
260 END REPeat loop
270 :
280 DEFine PROCedure player
290 CLS#0:centre 0," From which row ?"
300 AT#0,1,18:INPUT#0;row:IF NOT nim(row)THEN GO TO 300
310 CLS#0:centre 0,"Take how many ?"
320 AT#0,1,18:INPUT#0,take:IF take>nim(row)OR take<1 OR take<>INT(take) THEN GO TO 320
330 CLS#0:a$="You take " & take & " from row " & row:centre 0,a$:PAUSE 150
340 LET nim(row)=nim(row)-take
350 END DEFine player
360 :
370 DEFine PROCedure ql
380 sum=0:CLS#0
390 FOR j=1 TO 5:sum=sum ^^ nim(j)
400 IF NOT sum THEN FOR j=1 TO 5:IF nim(j)THEN row=j:take=RND(1 TO nim(row)):GO TO 470
410 FOR k=1 TO 8
420 FOR j=1 TO 5
430 IF nim(j)>=k AND sum>=k THEN row=j
440 NEXT j:NEXT k
450 take=nim(row) ^^ sum
460 take=ABS(nim(row)-take)
470 a$="I take " & take:centre 0,a$
480 a$="From row " & row:centre 0,a$
490 PAUSE 150
500 nim(row)=nim(row)-take
510 PAUSE 150
520 END DEFine ql
530 :
540 DEFine PROCedure centre (chan,a$)
550 LOCal j,k
560 j=37-LEN(a$)
570 FOR k=1 TO INT(j/2)
580 a$="(sp)" & a$
590 NEXT k
600 PRINT#chan,a$
610 RETurn
620 :
630 DEFine PROCedure display
640 CLS:BORDER 3,1,4
650 PRINT#3!"You"!pscore:AT 3,0,15:PRINT#3;"Me"!qlscore:AT#3,0,27:PRINT#3;"Played"!pscore+qlscore
660 AT 3,0:
670 FOR j=1 TO 5
680 INK 6:PRINT j;"(2*sp)";:INK 7
690 IF nim(j)
700 FOR k=1 TO nim(j)
710 BLOCK 15,10,k*25,j*20+10,5
720 NEXT k
730 END IF
740 INK 3:CURSOR nim(j)*25+16,j*20+10:PRINT"[";nim(j);"]"\\:NEXT j
750 END DEFine display
760 :
770 DEFine PROCedure replay
780 display
790 centre 0," Another Game ?"
800 key$=INKEY$(-1)
810 IF key$=="y"THEN GO TO 170
820 CLS#0:centre 0,"O.K."
830 STOP
840 END DEFine replay
```

IMPROVE your arcade games with a machine code routine which enables you to scroll part of the screen in four different directions. **Window Scrolls** by Pete Cooke of Leicester allows you to emulate professional programmers and simulate windows on the Spectrum.

The routine occupies 217 bytes in all and is stored in locations starting at 30000, so it will fit into a 16K Spectrum. If you have a 48K machine you should change the addresses to a higher value if you intend to write a long program.

To use the routine as it is written, you should first define the size of the window by changing the numbers POKED in lines 120 to 150. At present the routine sets up a window 25 pixels by 50.

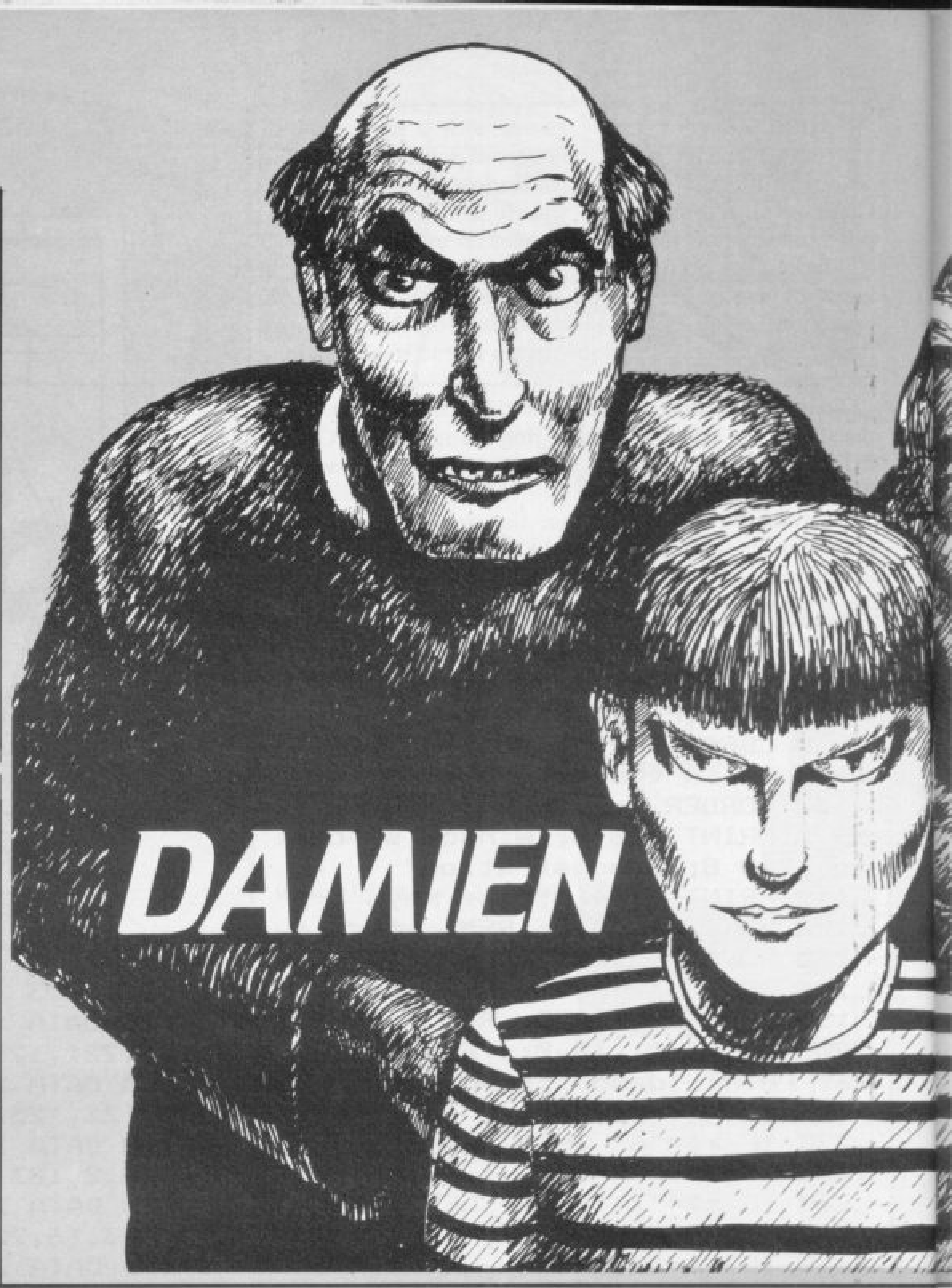
To control the scrolling, use the cursor keys. A game written using the program would thus be controlled by the cursor keys.



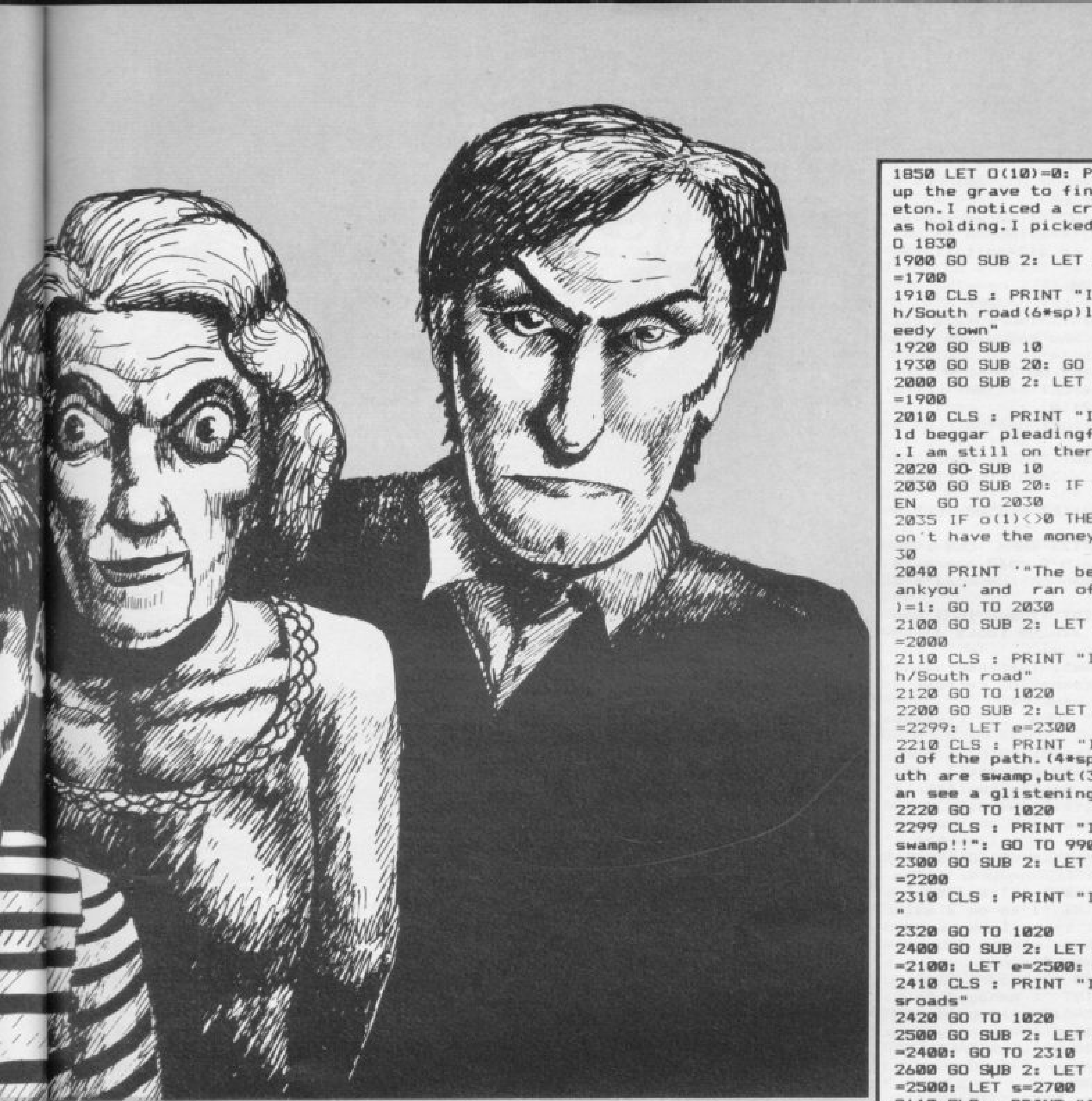

```
   1 REM Window scrolls
         in 4 directions
   2 REM  Pete cooke May 84
  10 CLEAR 30999: GO SUB 9500: R
EM poke in the data
 100 BORDER 1: PAPER 1: INK 7: C
LS : PRINT TAB 8;"Window scrolli
ng";TAB 8;"Demonstration"
 110 PRINT AT 4,8;"Use Keys 5-8"
 120 POKE 31214,5: REM  start x
 130 POKE 31215,5: REM start y
 140 POKE 31216,25: REM finishx
 150 POKE 31217,50: REM finishy
 200 PRINT AT 10,0;: FOR n=1 TO
76: PRINT "demo.";: NEXT n
 210 LET z$=INKEY$
 220 IF z$="6" THEN  LET v=USR 3
1003
 230 IF z$="7" THEN  LET v=USR 3
1000
 240 IF z$="5" THEN  LET v=USR 3
1006
 250 IF z$="8" THEN  LET v=USR 3
1009
 300 GO TO 210
8999 STOP
9000 DATA 195,36,121,195,82,121,
195,127,121,195
9010 DATA 165,121,221,33,238,121
,221,126,1,221
9020 DATA 70,3,128,197,245,205,2
00,121,125,221
9030 DATA 134,0,111,235,241,245,
61,205,200,121
9040 DATA 125,221,134,0,111,221,
78,2,6,0
9050 DATA 237,176,241,61,193,16,
222,201,221,33
9060 DATA 238,121,221,126,1,221,
70,3,197,245
9070 DATA 205,200,121,125,221,13
4,0,111,235,241
9080 DATA 245,60,205,200,121,125
,221,134,0,111
9090 DATA 221,78,2,6,0,237,176,2
41,60,193
9100 DATA 16,222,201,221,33,238,
121,221,126,1
9110 DATA 221,70,3,197,245,205,2
00,121,125,221
9120 DATA 134,0,221,134,2,111,22
1,70,2,183
9130 DATA 203,22,43,16,251,241,6
0,193,16,229
9140 DATA 201,221,33,238,121,221
,126,1,221,70
9150 DATA 3,197,245,205,200,121,
125,221,134,0
9160 DATA 111,221,70,2,183,203,3
0,35,16,251
9170 DATA 241,60,193,16,232,201,
213,33,0,0
9180 DATA 87,62,175,146,245,230,
7,103,241,245
9190 DATA 230,56,203,39,203,39,1
11,241,230,192
9200 DATA 203,63,203,63,203,63,1
32,103,17,0
9210 DATA 64,25,209,201,0,0,32,1
75
9500 CLS : PRINT AT 5,5;"Poking
in m/code";AT 7,5;"Please wait"
9510 LET total=0: RESTORE 9000:
FOR n=31000 TO 31217: READ a: LE
T total=total+a: POKE n,a
9520 NEXT n: IF total<>29511 THE
N  PRINT "Error in data."'"Do no
t run.": STOP
9530 RETURN
```

THE SPAWN of Satan, Damien Thorn, must be destroyed before he becomes powerful enough to take over the world. O Seaman of Chepstow in Gwent has written a text adventure program to allow you to do just that. A neat core program at lines 10–900 allows for large quantities of text. You will find it difficult to defeat Damien before falling prey to his demented followers, who are lurking everywhere to deceive and destroy you. Damien was written for the 48K Spectrum.

The program uses our special abbreviations for graphics characters, so please read the special instructions on the first page of Program Printout before typing in the program.




```
   1 GO TO 9000
   2 LET n=0: LET s=0: LET e=0:
LET w=0: LET u=0: LET d=0: RETUR
N
  10 PRINT '"Directions are:";("
North," AND n<>0);("South," AND
s<>0);("East," AND e<>0);("West,
" AND w<>0);("Up," AND u<>0);("D
own," AND d<>0);CHR$ 8;"(sp)"
  11 PRINT "I can see:"''
  12 LET fo=0: FOR q=1 TO 14: IF
 o(q)=line THEN  PRINT "A(sp)";o
$(q): LET fo=1
  13 NEXT q: IF fo=0 THEN  PRINT
 "Nothing"
  14 RETURN
  20 INPUT "What shall I do?(sp)
"; LINE q$
  21 IF q$="N" AND n<>0 THEN  LE
T line=n: GO TO line
  22 IF q$="S" AND s<>0 THEN  LE
T line=s: GO TO line
  23 IF q$="E" AND e<>0 THEN  LE
T line=e: GO TO line
  24 IF q$="W" AND w<>0 THEN  LE
T line=w: GO TO line
  25 IF q$="R" THEN  GO TO line
  26 IF q$="I" THEN  GO TO 900
  27 IF q$="U" AND u<>0 THEN  LE
T line=u: GO TO line
  28 IF q$="D" AND d<>0 THEN  LE
T line=d: GO TO line
  29 IF q$="U" OR Q$="D" OR Q$="
N" OR Q$="S" OR Q$="W" OR Q$="E"
 THEN  PRINT "I can't go that wa
y": GO TO 20
  30 IF Q$=" STOP " OR Q$="QUIT"
 THEN  GO TO 9990
  31 IF Q$="SAVE" THEN  GO TO 80
00
  32 IF Q$="LOAD" THEN  GO TO 85
00
  33 LET a$="": LET b$="": FOR q
=1 TO LEN q$
  34 IF q$(q)="(sp)" THEN  LET a
$=q$( TO q-1): LET b$=q$(q+1 TO
): GO TO 40
  35 NEXT q: PRINT "Huh?": GO TO
 20
  40 IF a$="PICK" OR a$="TAKE" T
HEN  GO TO 100
  45 IF a$<>"DROP" AND a$<>"PUT"
 THEN  RETURN
  50 FOR q=1 TO 14: IF b$=o$(q,
TO LEN b$) THEN  GO TO 60
  55 NEXT q: PRINT a$;"(sp)what?
": GO TO 20
  60 LET o(q)=line: PRINT "O.K.(
sp)": GO TO 20
 100 FOR q=1 TO 14: IF b$=o$(q,
TO LEN b$) THEN  GO TO 120
 110 NEXT q: PRINT a$;"(sp)what?
": GO TO 20
 120 IF o(q)<>line THEN  PRINT "
I can't see it here(sp)": GO TO
20
 130 LET o(q)=0: PRINT "O.K.": G
O TO 20
 900 PRINT ''"I have with me :"'
 910 LET fo=0: FOR q=1 TO 14: IF
 o(q)=0 THEN  PRINT "A(sp)";o$(q
): LET fo=1
 920 NEXT q: IF fo=0 THEN  PRINT
 "Nothing"
 925 IF o(6)=0 THEN  PRINT "And(
sp)";o(15);"(sp)bullet";("s" AND
 o(15)>1)
 930 GO TO 20
1000 GO SUB 2: LET n=1700: LET w
=1100: LET e=1200
1010 CLS : PRINT "I am outside a
 large mansion.(3*sp)West is a c
hurch,East is the(4*sp)mansion d
oor"
1020 GO SUB 10
1030 GO SUB 20: GO TO 1030
1100 GO SUB 2: LET e=1000
1110 CLS : PRINT "There is a pri
est here.He says:"''" Welcome.I
know why you are hereand I know
you are our only hopefor salvati
on.The beast is once more among
the world of men.I(3*sp)know he
is near.There are many(sp)"
1120 PRINT "of his disciples amo
ng us.You(3*sp)must kill him whi
le he is still a baby and is pow
erless.However only the holy kni
ves can kill "
1130 PRINT "him.Yet the powers o
f God have(sp)prepared well and
somewhere nearby is the knives.M
ay you have(3*sp)God's Holy bles
sing on your(5*sp)Quest."
1135 IF O(1)<>37 THEN  GO TO 115
0
1140 POKE 23692,0: PRINT '"He re
aches into the church(6*sp)resto
ration fund and gives me £5which
 I take."''
1141 LET o(1)=0
1145 PRINT )0;"Press a key": PAU
SE 1: PAUSE 0
1150 GO SUB 10
1160 GO SUB 20: GO TO 1160
1200 IF o(13)<>0 THEN  CLS : PRI
NT "The door is locked-You canno
t(3*sp)enter.": INPUT "Press ENT
ER"; LINE q$: LET line=1000: GO
TO 1000
1201 CLS : PRINT "I am in the ma
nsion.There is a(2*sp)wild dog t
hat is about to eat(3*sp)me."
1210 INPUT "What shall I use aga
inst it?(sp)"' LINE q$
1220 IF q$<>"LAMB" THEN  CLS : P
RINT "He has ignored me and eate
n me!": GO TO 9900
1230 PRINT "The dog is eating th
e meat-if I hurry I can get East
 unharmed"
1240 INPUT "Press ENTER to go Ea
st"; LINE q$: LET line=1300: GO
```



```
TO 1300
1300 CLS : PRINT "Damien's nurse
 has seen me,and(sp)guessed what
 I am about to do.(2*sp)She is c
oming at me with a(6*sp)poker!"
1310 INPUT "What shall I use aga
inst her?(sp)"' LINE q$
1320 IF q$<>"GUN" THEN CLS : PR
INT "She has killed me!!": GO TO
 9900
1330 PRINT '"I shot and killed h
er-I may now proceed East"
1340 INPUT "Press ENTER to go Ea
st"; LINE q$: LET line=1400: GO
TO 1400
1400 CLS : PRINT "I can see Dami
en in his cot.He(2*sp)has see me
.He has stood up-he isbigger tha
n I thought-to(8*sp)strangle me"
1410 INPUT "What shall I use aga
inst him?(sp)"' LINE q$
1420 IF q$<>"KNIVES" THEN CLS :
 PRINT "He has killed me!!": GO
TO 9900
1430 CLS : PRINT "Success!!YOU H
AVE KILLED DAMIEN"'"You have des
troyed the anti-(4*sp)christ and
 so are the saviour of the world
!!"
1440 GO TO 9990
1500 GO SUB 2: LET E=1600
1510 CLS : PRINT "I can see a gr
ave"
1520 GO SUB 10
1530 GO SUB 20
1540 IF a$<>"DIG" THEN GO TO 15
30
1545 IF o(7)<>0 THEN PRINT "Wha
t with?": GO TO 1530
1550 CLS : PRINT "I dug up the g
rave and out of itflew 13 black
ravens,who have(3*sp)killed me!"
: GO TO 9900
1600 GO SUB 2: LET n=1800: LET w
=1500: LET e=1700
1610 CLS : PRINT "I can see a gr
ave.Also,on it is enscribed 'Her
e lies Mrs Thorn'"
1620 GO SUB 10
1630 GO SUB 20
1640 IF a$<>"DIG" THEN GO TO 16
30
1645 IF o(7)<>0 THEN PRINT "Wha
t with?": GO TO 1630
1650 PRINT '"I dug up the grave
and found theskeleton of a jacka
l!": GO TO 1630
1700 GO SUB 2: LET w=1600: LET n
=1900: LET s=1000
1710 CLS : PRINT "I am at the ed
ge of a graveyard to my West."
1720 GO SUB 10
1730 GO SUB 20: GO TO 1730
1800 GO SUB 2: LET s=1600
1810 CLS : PRINT "I can see a gr
ave"
1820 GO SUB 10
1830 GO SUB 20
1840 IF a$<>"DIG" THEN GO TO 18
30
1845 IF o(7)<>0 THEN PRINT "Wha
t with?": GO TO 1830
1850 LET O(10)=0: PRINT '"I dug
up the grave to find a(4*sp)skel
eton.I noticed a cross that it w
as holding.I picked it up": GO T
O 1830
1900 GO SUB 2: LET n=2000: LET s
=1700
1910 CLS : PRINT "I am on a Nort
h/South road(6*sp)leading to a s
eedy town"
1920 GO SUB 10
1930 GO SUB 20: GO TO 1930
2000 GO SUB 2: LET n=2100: LET s
=1900
2010 CLS : PRINT "I can see an o
ld beggar pleadingfor some money
.I am still on theroad"
2020 GO SUB 10
2030 GO SUB 20: IF a$<>"GIVE" TH
EN GO TO 2030
2035 IF o(1)<>0 THEN PRINT "I d
on't have the money!!": GO TO 20
30
2040 PRINT '"The beggar said 'Th
ankyou' and ran off!!": LET o(1
)=1: GO TO 2030
2100 GO SUB 2: LET N=2400: LET s
=2000
2110 CLS : PRINT "I am on a Nort
h/South road"
2120 GO TO 1020
2200 GO SUB 2: LET n=2299: LET s
=2299: LET e=2300
2210 CLS : PRINT "I am at the en
d of the path.(4*sp)North and So
uth are swamp,but(3*sp)North I c
an see a glistening"
2220 GO TO 1020
2299 CLS : PRINT "I sank in the
swamp!!": GO TO 9900
2300 GO SUB 2: LET e=2400: LET w
=2200
2310 CLS : PRINT "I am on a path
"
2320 GO TO 1020
2400 GO SUB 2: LET n=3200: LET s
=2100: LET e=2500: LET w=2300
2410 CLS : PRINT "I am on a cros
sroads"
2420 GO TO 1020
2500 GO SUB 2: LET e=2600: LET w
=2400: GO TO 2310
2600 GO SUB 2: LET e=3000: LET w
=2500: LET s=2700
2610 CLS : PRINT "I am on a path
.South is a beggar": GO TO 1020
2700 GO SUB 2: LET n=2600
2710 CLS : PRINT "There is a Beg
gar here.He says(2*sp)he will se
ll you a Red Crystal(2*sp)for on
ly £5"
2720 GO SUB 10
2730 GO SUB 20: IF a$<>"GIVE" TH
EN GO TO 2730
2735 IF o(1)<>0 THEN PRINT "I d
on't have any money": GO TO 2730
2740 PRINT "He has given me the
crystal and takes £5"
2750 LET o(1)=1: LET o(8)=0: GO
TO 2730
2900 GO SUB 2: LET s=3000
2910 CLS : PRINT "There is an ol
d grave-digger(4*sp)here who say
s he'll give me his spade in ret
urn for £5 or some(2*sp)silver"
2920 GO SUB 10
2930 GO SUB 20: IF a$<>"GIVE" TH
EN GO TO 2930
2935 IF b$<>"£5" AND b$<>"SILVER
" THEN PRINT "Give him what?":
GO TO 2930
2940 IF b$="£5" AND o(1)<>0 THEN
 PRINT "I don't have £5": GO TO
 2930
2950 IF b$="SILVER" AND o(5)<>0
THEN PRINT "I don't have any si
lver": GO TO 2930
2960 PRINT "He says 'O.K.' and g
ives you hisspade"
2970 LET o(7)=0: LET o(1+(4 AND
b$="SILVER"))=1: GO TO 2930
```

continued on page 120

continued from page 119

```
3000 GO SUB 2: LET n=2900: LET s
=3100: LET w=2600
3010 CLS : PRINT "I am at the en
d of the path.(4*sp)North is an
old man,South is a(2*sp)tall fig
ure."
3020 GO TO 1020
3100 GO SUB 2: LET n=3000
3110 CLS : PRINT "There is a tal
l figure here who has given me a
 Black Crystal!!!"
3120 LET o(9)=0: GO TO 1020
3200 GO SUB 2: LET n=3300: LET s
=2400: GO TO 2110
3300 GO SUB 2: LET n=3400: LET s
=3200
3310 CLS : PRINT "To my North is
 the start of a(3*sp)city.": GO
TO 1020
3400 GO SUB 2: LET N=3500: LET S
=3300
3405 IF O(16)=123 THEN  CLS : PR
INT "I am on a N/S road,there is
 a(3*sp)dead man on the road": G
O TO 1020
3410 CLS : PRINT "There is a man
 here with an axe.He looks dange
rous!."
3420 INPUT "Shall I attempt hand
-to-axe(5*sp)combat,or retreat S
outh? (F/R)"; LINE q$
3430 IF q$="R" THEN  LET line=s:
 GO TO line
3440 LET o(16)=123: PRINT ''"He
swiped at me with his axe.I  duc
ked,and kicked him in the(4*sp)s
hin.He reeled,fell,and died.(3*s
p)There is now an axe on the(6*s
p)ground."
3450 LET O(2)=LINE: GO TO 1020
3500 GO SUB 2: LET n=3800: LET s
=3400: LET w=3600: LET e=3700
3510 CLS : PRINT "I am on a main
 N/S road.West is a flimsy woode
n door,East is a  strong door wi
th a red knocker."
3520 GO TO 1020
3600 CLS : PRINT "I managed to b
reak through the(2*sp)door,to fi
nd a man,who said 'Howdare you b
reak my door down!'.Hethen shot
me!!"
3610 GO TO 9900
3700 GO SUB 2: LET w=3500
3710 CLS : PRINT "There is a tal
l robed figure(4*sp)here who tel
ls me I can only go East if I gi
ve him a Red Crystal"
3720 GO SUB 10
3730 GO SUB 20: IF a$<>"GIVE" TH
EN  GO TO 3730
3740 IF o(8)<>0 THEN  PRINT "I d
on't have a Red Crystal": GO TO
3730
3750 PRINT ''"He said 'Thankyou'
 and cackled alittle.I went East
 to find 13(3*sp)Devil Worshippe
rs,who killed me!!": GO TO 9900
3800 GO SUB 2: LET w=3899: LET e
=3900: LET n=4500: LET s=3500
3810 CLS : PRINT "To my East is
an alleyway,and(3*sp)West is a f
limsy wooden door"
3820 GO TO 1020
3899 PRINT "I broke down the doo
r to find a ring of chain smoker
s,who(7*sp)offered me a puff.I a
ccepted andwished I hadn't": GO
TO 9900
3900 GO SUB 2: LET N=4600: LET E
=4000: LET W=3800
3910 CLS : PRINT "I am in a seed
y alley.North is(2*sp)a flimsy w
ooden door."
3920 GO TO 1020
4000 GO SUB 2: LET N=4100: LET e
=4200: LET w=3900
4010 CLS : PRINT "Here is a Begg
ar who asks me fora black crysta
l or £5 in return for a Red key.
"
```




```
4020 GO SUB 10
4030 GO SUB 20: IF a$<>"GIVE" TH
EN  GO TO 20
4040 IF b$<>"£5" AND b$<>"BLACK
CRYSTAL" THEN  PRINT "Give what?
": GO TO 4030
4050 IF o(1+(8 AND b$="BLACK CRY
STAL"))<>0 THEN  PRINT "I don't
have it": GO TO 4030
4060 PRINT "He gives you the Red
 Key": LET o(1+(8 AND b$="BLACK
CRYSTAL"))=1: LET o(4)=0: GO TO
4030
4100 GO SUB 2: LET s=4000
4110 CLS : PRINT "I am at the en
d of an alleyway"
4115 IF o(5)=4100 THEN  PRINT "I
 can see,lying in a bin,a largep
iece of silver!!"
4120 GO TO 1020
4200 GO SUB 2: LET e=4300: LET w
=4000
4210 CLS : PRINT "I am still in
this alley.To the East is a shor
t robed figure.": GO TO 1020
4300 GO SUB 2: LET w=4200
4310 CLS : PRINT "There is a sho
rt figure with a(2*sp)gun about
to shoot me!"
4320 INPUT "Which object shall I
 use againsthim? "; LINE q$: IF
q$<>"AXE" THEN  PRINT ''"No use
- He has shot me!": GO TO 9900
4330 PRINT ''"(sp)He fired a sho
t at me,but I(4*sp)deflected it
with my axe.He(5*sp)pulled the t
rigger again but I  threw the ax
e at him,which(6*sp)cleaved his
skull.He has left(3*sp)his gun a
nd its four remaining bullets on
 the ground."
4340 GO TO 1020
4400 GO SUB 2: LET E=4500
4410 CLS : PRINT "I am in a Butc
hers.They have a(2*sp)special of
fer on - a leg of lambfor only £
5!!"
4420 GO SUB 10
4430 GO SUB 20: IF a$<>"GIVE" AN
D a$<>"BUY" THEN  GO TO 4430
4440 IF o(1)<>0 THEN  PRINT "I h
ave no money": GO TO 4430
4450 PRINT "You have the lamb(sp
)": LET o(1)=1: LET o(11)=0: GO
TO 4430
4500 GO SUB 2: LET n=4800: LET s
=3800: LET w=4400: LET d=5700
4510 CLS : PRINT "I am in the st
reet.West is a(4*sp)Butchers wit
h a special offer on.There is an
 open manhole below. It looks a
bit dark!"
4520 GO TO 1020
4600 GO SUB 2: LET s=3900
4610 CLS : PRINT "I am in a shed
.On the wall is(3*sp)painted '66
6'.Lying on the(6*sp)ground is a
 yellow key": GO TO 1020
4700 GO SUB 2: LET e=4800
4710 CLS : PRINT "I am in a gard
ening shop.There(2*sp)is a naggi
ng old woman here.She says eithe
r buy something or(4*sp)leave.Th
ey seem to be a bit low on stock
 at the moment-they onlyhave a s
pade,selling for £5"
4720 INPUT "Do you want to buy i
t (Y/N)"; LINE q$
4725 IF q$="" THEN  GO TO 4720
4730 IF q$(1)<>"Y" THEN  GO TO 1
020
4735 IF o(1)<>0 THEN  PRINT '"I
don't have £5": GO TO 1020
4740 LET o(1)=1: LET o(7)=0: GO
TO 1020
4800 GO SUB 2: LET n=5100: LET s
=4500: LET w=4700: LET e=4900
4810 CLS : PRINT "I am still in
this seedy town.(2*sp)West is a
gardening shop,East isa door wit
h a black knocker on. It says 'P
lease Knock'.": GO TO 1020
4900 GO SUB 2: LET w=4800
4910 CLS : PRINT "I am in a larg
e dusty house.(4*sp)There is a c
loaked figure who(3*sp)says I ca
n go East through a biglocked do
```



```
or only on receipt of a Black Cr
ystal."
4920 GO SUB 10
4930 GO SUB 20: IF a$<>"GIVE" TH
EN  GO TO 4930
4940 IF o(9)<>0 THEN  PRINT "I d
on't have a black crystal": GO T
O 4930
4950 PRINT "He says 'Ta' and rev
iels a bunchof keys with which h
e unlocks(3*sp)the door.It creak
s open.I can(3*sp)now go East.":
 GO TO 4930
5000 CLS : PRINT "I walked throu
gh the door to(4*sp)find a meeti
ng of software(6*sp)writers.They
 grabbed and bound meOne of them
 said 'I could write a game arou
nd this.'He showed mea gun he di
signed for one of hisgames.It re
ally worked-he tried it out on m
e.": GO TO 9900
5100 GO SUB 2: LET w=5150: LET e
=5200: LET n=5500: LET s=4800
5110 CLS : PRINT "To my East is
a red door,West isa yellow door.
"
5120 GO TO 1020
5150 IF o(3)<>0 THEN  PRINT "I d
o not have the key to unlock the
 door(sp)": GO TO 1030
5160 CLS : PRINT "I have found a
 bunch of men(5*sp)sacrificing a
 pig.I felt sorry(2*sp)for it an
d so hit and knocked(3*sp)out th
e men.The pig was so happythat i
t jumped up on me and(5*sp)suffo
cated me!!": GO TO 9900
5200 IF o(4)<>0 THEN  PRINT "I d
o not have the key to unlock the
 door(sp)": GO TO 1020
5205 GO SUB 2: LET n=5400: LET e
=5300: LET w=5100
5210 CLS : PRINT "I am in a dark
 hallway.North andEast are rooms
 in which(9*sp)ceremonies seem t
o be taking(4*sp)place."
5220 GO TO 1020
5300 GO SUB 2
5310 CLS : PRINT "There are thre
e devil worshippershere.They see
m to want to(7*sp)sacrifice me.T
he high priest hasa small Black
key."
5320 GO SUB 20: IF a$<>"SHOOT" T
HEN  PRINT "They have burned me!
!": GO TO 9900
5321 IF o(15)<3 THEN  PRINT "I d
on't have enough bullets for all
 of them.They seem to have(3*sp)
boiled me!": GO TO 9900
5325 IF o(6)<>0 THEN  PRINT "I d
on't have a gun.They seem to hav
e boiled me!": GO TO 9900
5330 PRINT '"I fired 3 shots at
them,killing them all.There is n
ow a Black(3*sp)key lying on the
 ground"
5340 LET w=5200: LET o(15)=o(15)
-3: LET o(12)=line: GO TO 1020
5400 CLS : PRINT "I entered the
room.There was a(2*sp)strange ma
n who promptly locked the door b
ehind me.He offered mea drink (a
t gunpoint).I drank itand,all of
 a sudden,I seemed to grow small
er!When I was about 10inches hig
h,I heard him say 'It works'.I s
hrank another foot,and there was
 nothing left of me!": GO TO 990
0
5500 GO SUB 2: LET w=5600: LET s
=5100
5510 CLS : PRINT "I am at the en
d (at last) of thelong road I ha
ve been walking(3*sp)down.To my
West I can see an oldman": GO TO
 1020
5600 GO SUB 2: LET e=5500
5610 CLS : PRINT "I can see an o
ld man.He says to me 'That is a
nice axe you have there.You woul
dn't want to swap it for an old
white key,would(3*sp)you?'"
5620 GO SUB 10
5630 GO SUB 20: IF a$<>"GIVE" TH
EN  GO TO 5630
5640 IF o(2)<>0 THEN  PRINT "I d
on't have an axe.": GO TO 5630
5650 PRINT "I told him I would d
o the swap. He agreed,took my ax
e,gave me(3*sp)the white key,and
 promptly blew up!": LET o(2)=1:
 LET o(13)=0: GO TO 5630
5700 GO SUB 2: LET u=4500: LET n
=5800
5710 CLS : PRINT "I am in a smel
ly sewer,at the(3*sp)bottom of a
 ladder.": GO TO 1020
5800 GO SUB 2: LET n=5900: LET s
=5700
5810 CLS : PRINT "I am in an und
erground,dark,damp,smelly,drippi
ng,rat infested(3*sp)tunnel,(It
isn't nice).": GO TO 1020
5900 GO SUB 2: LET s=5800
5910 CLS : PRINT "I am at the en
d of the tunnel.I have found a w
hite door with a(2*sp)metal cros
s on the door.It is(3*sp)locked.
"
5920 GO SUB 10
5930 GO SUB 20: IF a$<>"UNLOCK"
THEN  GO TO 5930
5940 IF o(13)<>0 THEN  PRINT "I
don't have the key to unlock(2*s
p)it with": GO TO 5930
5950 PRINT "I have unlocked the
door.I can(2*sp)now go East.": L
ET e=6000: GO TO 5920
6000 GO SUB 2
6010 CLS : PRINT "Here is a towe
ring figure.He(4*sp)looks grueso
me.Help!"
6020 GO SUB 20: IF b$<>"CROSS" T
HEN  PRINT "He covered me in his
 cloak and- I disappeared!!": GO
 TO 9900
6030 IF o(10)<>0 THEN  PRINT "I
dont have a cross(worst luck).He
 covered me in his cloak and- I
disappeared!!": GO TO 9900
6040 PRINT "He cowers back and l
ets me past.": LET w=5900: LET n
=6100: GO TO 1020
6100 GO SUB 2: LET n=6200: LET s
=6000
6110 CLS : PRINT "I am in a corr
idor between 2(4*sp)doors.": GO
TO 1020
6200 GO SUB 2: LET s=6100
6210 CLS : PRINT "There is a man
 here,who gives mesome pretty kn
ives.He says they are the only t
hings that will(3*sp)kill Damien
,and then only if notat all soil
ed by killing(8*sp)anything else
.": GO TO 1020
8000 CLS : PRINT "SAVE - Prepare
 tape"
8010 LET o(16)=line
8020 SAVE "D-CODE"+STR$ line DAT
A o()
8030 CLS : PRINT "VERIFY - Press
 Y(es) or N(o) "
8040 IF INKEY$="N" THEN  GO TO 1
ine
8050 IF INKEY$<>"Y" THEN  GO TO
8040
8060 PRINT '''"If you get an"'"
R Tape Loading Error'"'"Then typ
e 'GOTO G'"'"(Press 'G' twice,&
ENTER)"'''"Press any key when re
ady."
8070 IF INKEY$="" THEN  GO TO 80
70
8080 LET g=8090: VERIFY "D-CODE"
+STR$ line DATA o(): GO TO line
8090 CLS : PRINT "Options:"'''"1
 Reverify"'"2 Resave"'"3 Quit"''
"Press option"
8100 LET w$=INKEY$: IF w$>"3" OR
 w$<"1" THEN  GO TO 8100
8110 IF w$="1" THEN  GO TO 8030
8120 IF w$="2" THEN  GO TO 8000
8130 GO TO line
8500 CLS : PRINT "LOADING - Pres
s a key when ready"
8510 IF INKEY$="" THEN  GO TO 85
10
8520 DIM o(16): LOAD "" DATA o()
: LET line=o(16): GO TO line
9000 BORDER 1: INK 7: PAPER 1: F
LASH 0: BRIGHT 0: OVER 0: INVERS
E 0: CLEAR
9010 PRINT "(10sp)WELCOME TO(sp)
"
9020 PRINT ''"(3*sp,ig4,g3,ig7,s
p,ig6,g3,ig7,sp,ig1,g4,ig5,sp,g3
,ig4,g2,sp,ig4,g3,g2,sp,ig1,sp,i
g5,9*sp,ig5,sp,ig5,sp,ig4,g3,ig5
,sp,ig5,g2,ig5,2*sp,ig5,2*sp,ig4
,g3,2*sp,ig5,g6,ig5,9*sp,2*g3,2*
sp,g2,sp,g2,sp,g2,sp,g2,sp,2*g3,
g2,sp,2*g3,g2,sp,g2,sp,g2)"
9030 PRINT '''" You must destroy
 Damien,Son of the Devil,while h
e is still a(3*sp)baby and is th
us relatively(5*sp)powerless."
9040 PRINT '''"Press any Key to
start"
9050 IF INKEY$="" THEN  GO TO 90
50
9055 POKE 23658,8: PRINT AT 16,0
,,
9060 DIM o$(14,13): DIM o(16): L
ET O(15)=4
9070 RESTORE 9100: FOR q=1 TO 14
: READ o$(q),o(q): NEXT q
9080 LET line=1000: GO TO line
9100 DATA "£5",37,"AXE",1,"YELLO
W KEY",4600,"RED KEY",1,"SILVER"
,4100,"GUN",4300,"SPADE",1,"RED
CRYSTAL",3100,"BLACK CRYSTAL",1,
"CROSS",1,"LAMB",2,"BLACK KEY",1
,"WHITE KEY",8,"KNIVES",6200
9900 PRINT '"Bad luck - Have an
other go"
9990 INPUT "Press ENTER to repla
y,or 'NO' toclear this program o
ut(sp)"' LINE q$: IF q$="NO" THE
N  RANDOMIZE USR 0
9991 RUN
```

ALIEN LANDING

HERE THEY come again, those awful aliens, spreading gloom, destruction, and obscure skin diseases all over the world. Will they succeed? Never — not while you are at the controls, at any rate. Use keys 5 and 8 to move your laser base and 0 to launch missiles at the horrible foe.

Alien Landing was written by Howard Ramsay of Glasgow for the ZX-81 with 16K. Howard says he would be thrilled if we publish his program. We hope the aliens are too.



```
   1 REM  ALIEN LANDING
   5 LET B$="B"
   6 LET C$="I"
  10 SLOW
  90 LET HS=0
 100 REM  INSTRUCTIONS
 110 FOR F=1 TO 22
 120 PRINT "                                "
 130 NEXT F
 140 PRINT AT 0,0;"                                ";AT 1,0;" ALIEN LANDING                  ";
AT 2,0;" BY HOWARD RAMSAY "
 150 PRINT AT 3,0;"                                "
 170 PRINT AT 6,3;"WELCOME TO ALIEN LANDING"
 180 PRINT AT 7,2;"                                "
 190 PRINT AT 9,0;"  THE OBJECT OF THIS GAME IS TO  PREVENT THE ALIEN (";B$;") FROM       LANDING ON YOUR BASE       . YOU   DO THIS BY FIRING YOUR MISSILE     AT IT   . EACH TIME YOU        MANAGE TO SHOOT ONE DOWN YOU     PROGRESS TO A MORE DIFFICULT     LEVEL."
 195 PRINT AT 17,0;"  DO YOU WANT TO TYPE IN A         CHARACTER FOR THE ALIEN (Y) OR  USE THE PREVIOUSLY MENTIONED     ONE (N)."
 196 LET Z$=INKEY$
 197 IF Z$<>"N" AND Z$<>"Y" THEN GOTO 196
 198 IF Z$="N" THEN GOTO 202
 199 INPUT B$
 200 IF LEN B$<>1 THEN GOTO 199
 201 PRINT AT 10,20;B$
 202 PRINT AT 17,0;"  DO YOU WANT TO TYPE IN YOUR        OWN CHARACTER FOR THE MISSLE      (Y) OR USE THIS (I) (N)."
 203 LET X$=INKEY$
 204 IF X$<>"N" AND X$<>"Y" THEN GOTO 203
 205 IF X$="N" THEN GOTO 209
 206 INPUT C$
 207 IF LEN C$<>1 THEN GOTO 206
 210 FOR F=17 TO 21
 211 PRINT AT F,0;"                                "
 212 NEXT F
 218 PRINT AT 20,3;"PRESS A KEY TO CONT..."
 219 IF INKEY$="" THEN GOTO 219
 220 FOR F=6 TO 19
 230 PRINT AT F,0;"                                "
 240 NEXT F
 250 PRINT AT 5,0;"  YOU START WITH THREE LIVES    BUT YOU LOSE A LIFE EVERY TIME   AN ALIEN LANDS, YOU GET AN       EXTRA LIFE FOR EVERY TWO        ALIENS YOU SHOOT DOWN."
 260 PRINT AT 11,0;"  USE THE FOLLOWING KEYS..."
 270 PRINT AT 12,4;"5-LEFT";AT 12,14;"8-RIGHT";AT 14,4;"0-FIRE";
AT 14,14;"1-ABORT"
 275 PRINT AT 16,0;"  USE KEYS 5+8 TO GUIDE YOUR          MISSILE."
 280 PRINT AT 20,18;"PLAY..."
 290 IF INKEY$="" THEN GOTO 290
 500 REM  DEFINE VARIABLES
 510 LET A=3
 520 LET B=INT (RND*29)+2
 530 LET C=20
 540 LET D=12
 550 LET E=.1
 560 LET LF=3
 570 LET SC=0
 580 LET Z=0
 700 REM  PLAY
 710 FOR F=1 TO 22
 720 SCROLL
 730 PRINT AT 21,0;"                                "
 740 NEXT F
 741 FOR F=1 TO 21
 742 PRINT AT F,0;" ";AT F,31;" "
 743 NEXT F
 744 PRINT AT 0,0;"                                ";AT 21,0;"                                "
 745 PRINT AT 2,1;"                              "
 750 PRINT AT 20,1;"                              "
 755 PRINT AT 1,1;"SCORE=";SC;TAB 11;"LIVES=";LF;AT 1,19;"HI-SCORE=";HS
 760 PRINT AT A,B;B$;AT A,B;" "
 770 PRINT AT C,D;"   "
 775 IF A>19 THEN GOTO 2000
 780 IF RND<E THEN GOSUB 900
 785 IF B>29 THEN LET B=1
 790 LET B=B+1
 800 LET D=D+(INKEY$="8")-(INKEY$="5")
 805 IF INKEY$="0" THEN GOSUB 1000
 810 IF D=27 THEN LET D=D-1
 820 GOTO 760
 900 REM  STAGGER ALIEN
 910 LET A=A+1
 920 LET B=B+1
 925 IF B>29 THEN LET B=1
 927 IF A>19 THEN GOTO 2000
 930 RETURN
1000 REM  FIRE
1010 LET P=D+2
1020 LET Q=19
1030 PRINT AT Q,P;C$;AT Q,P;" "
1032 PRINT AT C,D;"   "
1033 IF D=27 THEN LET D=26
1035 LET Q=Q-1
1040 LET A$=INKEY$
1045 LET P=P-(A$="5")+(A$="8")
1047 LET D=D-(A$="5")+(A$="8")
1048 IF A$="1" THEN GOTO 1500
1050 LET B=B+1
1060 IF B>29 THEN LET B=2
1070 PRINT AT A,B;B$;AT A,B;" "
1080 IF RND<E THEN GOSUB 900
1090 IF A=Q AND (B=P OR B=P+1 OR B=P-1) THEN GOTO 1500
1110 IF Q<A THEN RETURN
1120 GOTO 1030
1500 PRINT AT Q,P;"";AT Q,P;"";AT Q,P;"";AT Q,P;"";AT Q,P;"";AT Q,P;"";AT Q,P;"";AT Q,P;""
1503 IF A$="1" THEN GOTO 760
1505 PRINT AT Q,P;"";AT Q,P;"";AT Q,P;"";AT Q,P;"O";AT Q,P;""
1510 LET SC=SC+(21-A)+10
1520 LET Z=Z+1
1530 IF Z=2 THEN LET LF=LF+1
1535 IF Z=2 THEN LET Z=0
1540 LET E=E+.1
1550 PRINT AT 1,7;SC
1551 LET A=3
1552 LET B=INT (RND*29)+2
1553 IF SC>HS THEN LET HS=SC
1554 LET D=12
1560 GOTO 710
2000 REM  LF-1
2005 LET E=E-.1
2010 LET LF=LF-1
2020 LET A=3
2025 LET D=12
2030 LET B=INT (RND*29)+2
2040 IF LF>0 THEN GOTO 700
2050 PRINT AT 1,1;"                     GAME OVER                   "
2060 FOR F=1 TO 20
2070 PRINT AT 20,1;"                              ";AT 20,1;"                              "
2080 NEXT F
2090 PRINT AT 20,1;"                              "
2100 PRINT AT 5,5;"ANOTHER GAME (Y/N)?"
2110 LET A$=INKEY$
2120 IF A$="" THEN GOTO 2110
2130 IF A$="Y" THEN GOTO 500
2140 PRINT AT 7,8;"SURE (Y/N)?"
2150 LET A$=INKEY$
2160 IF A$="" THEN GOTO 2150
2170 IF A$="N" THEN GOTO 500
2180 NEW
8000 SAVE "ALIEN LANDING"
8010 RUN
```

OLYMPICS



BECOME THE second greatest athlete in the world in a gruelling four-event schedule. In the long jump you must press 'J' when you are told to jump. In the Shot Put press 'S' to start and 'T' to throw. In the 100 metres sprint press 'Z' and 'X' alternately to run. In the 400 metres hurdles you must press 'J' to jump.

Your best efforts will be displayed at the end along with your total score. Save the program with the command RUN 9000.

Olympics was written for the 16K ZX-81 by K Snowdon of Dunston in Tyne and Wear.

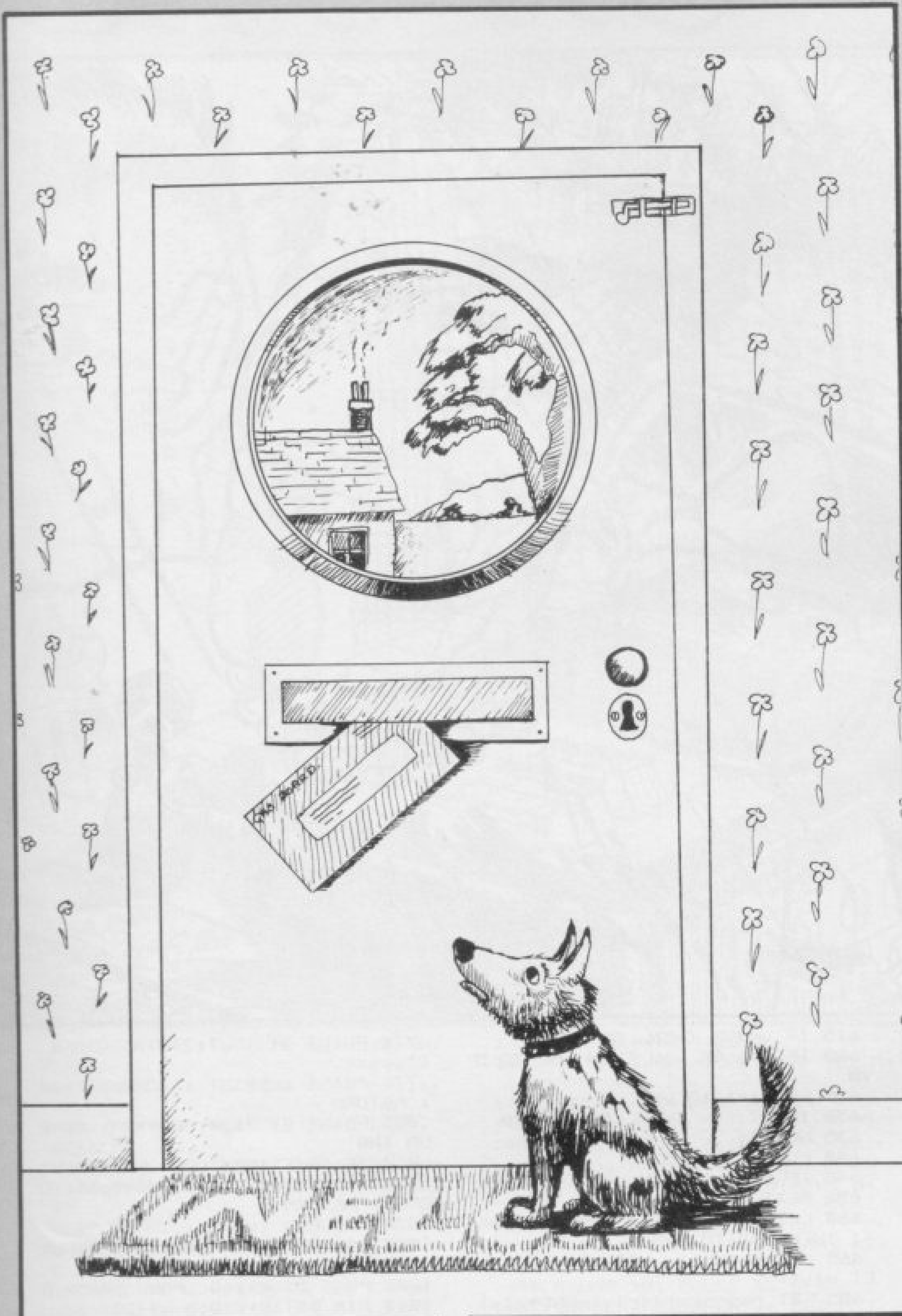
```
   1 LET TS=0
   2 GOSUB 1000
   3 LET B=0
   4 LET L=3
   5 PRINT AT 21,0;A$
   6 LET C=0
  10 FOR N=31 TO 6 STEP -2
  20 PRINT AT 20,N;"▌ "
  30 GOTO 510
 100 FOR S=1 TO 5
 110 NEXT S
 120 RETURN
 510 PRINT AT 14,3;"▒";AT 15,3;"▛";AT 17,4;" ";AT 20,1;" ";AT 19,1;"▌";AT 19,2;"▀";AT 17,1;" ";AT 18,2;" ";AT 17,2;"▚";AT 20,5;" ";AT 20,4;"▙";AT 19,4;"▌";AT 18,3;"▙";AT 16,4;" ";AT 16,3;"█";AT 16,2;"▌"
 520 PRINT AT 20,4;" ";AT 20,3;"▙";AT 19,4;" ";AT 19,3;"▛";AT 18,3;"▙";AT 19,1;" ";AT 19,2;"▌";AT 16,3;"▙";AT 17,4;"▀";AT 16,2;"▖";AT 17,2;"▀"
 521 PRINT AT 20,N-1;"▌ "
 522 PRINT AT 20,3;" ";AT 20,1;"▙";AT 19,3;" ";AT 19,1;"▖";AT 19,1;"▖";AT 17,1;"▌";AT 17,2;" ";AT 18,2;"▖";AT 16,3;"▌";AT 19,2;"▀";AT 18,2;"▖";AT 16,2;"▞";AT 18,3;"▚";AT 17,3;"▛";AT 16,3;"▌";AT 15,3;"▛";AT 14,3;"▒";AT 19,4;"▚";AT 16,4;"▌";AT 20,4;" ";AT 20,5;"▙"
 530 PRINT AT 20,N-1;"  "
 540 NEXT N
 542 IF INKEY$="J" THEN GOTO 780
 550 PRINT AT 21,5;"▒▒▒▒▒▒▒▒"
 560 FOR C=1 TO 100
 570 IF INKEY$="J" THEN GOTO 600
 580 NEXT C
 600 PRINT AT 18,2;" ";AT 19,1;" ";AT 16,3;"▙";AT 20,1;" ";AT 20,2;"▀";AT 19,2;"▄";AT 19,3;"▌";AT 18,3;"▛";AT 18,4;"▖";AT 19,4;"▌";AT 20,5;" ";AT 20,4;"▙";AT 17,1;" ";AT 17,2;"▀";AT 16,2;"▖";AT 17,4;"▀";AT 16,4;"▀";AT 15,4;"▖"
 605 PRINT AT 21,4;"▒▒▒▒▒▒▒▒"
 610 PRINT AT 20,2;" ";AT 16,2;" ";AT 17,2;" ";AT 20,3;"▙";AT 19,3;"▛";AT 19,2;"▌";AT 17,4;"▀";AT 15,4;"▖";AT 20,4;" ";AT 19,4;" ";AT 18,4;"▖";AT 18,3;"▙"
 615 PRINT AT 21,3;"▒▒▒▒▒▒▒▒"
 620 PRINT AT 16,4;" ";AT 20,3;" ";AT 19,3;"▖";AT 19,2;"▀";AT 18,2;"▌";AT 18,3;"▞";AT 17,3;"▙";AT 15,3;"▛";AT 14,3;"▛";AT 13,3;"▒";AT 14,4;"▞";AT 17,4;" ";AT 16,4;" ";AT 18,4;" "
 626 PRINT AT 21,2;"▒▒▒▒▒▒▒▒"
 630 PRINT AT 16,4;" ";AT 20,3;" ";AT 19,3;"▖";AT 19,2;"▀";AT 18,2;"▌";AT 18,3;"▞";AT 17,3;"▙";AT 15,3;"▛";AT 14,3;"▛";AT 13,3;"▒";AT 14,4;"▞";AT 17,4;" ";AT 16,4;" ";AT 18,4;" "
 632 PRINT AT 21,1;"▒▒▒▒▒▒▒▒"
 635 PRINT AT 16,4;" ";AT 20,3;" ";AT 19,3;"▖";AT 19,2;"▀";AT 18,2;"▌";AT 18,3;"▞";AT 17,3;"▙";AT 15,3;"▛";AT 14,3;"▛";AT 13,3;"▒";AT 14,4;"▞";AT 17,4;" ";AT 16,4;" ";AT 18,4;" "
 636 PRINT AT 21,0;"▒▒▒▒▒▒▒▒"
 640 PRINT AT 17,3;"▌";AT 13,3;" ";AT 14,3;"▒";AT 14,4;" ";AT 15,4;"▖";AT 16,4;"▀";AT 16,3;"▛";AT 18,2;" ";AT 19,2;" ";AT 18,3;"▙";AT 19,4;"▚";AT 20,4;"▀";AT 20,5;"▀";AT 19,3;" "
 642 PRINT AT 21,0;"▒▒▒▒▒▒▒▒"
 650 PRINT AT 14,3;" ";AT 15,3;" ";AT 16,3;" ";AT 15,4;"▒";AT 16,4;"▛";AT 17,4;"▌";AT 17,5;"▖";AT 17,3;"▖";AT 18,3;"▌";AT 18,4;"▀";AT 18,5;"▀";AT 19,3;"▀";AT 19,4;"▚";AT 20,5;"▚";AT 20,6;"▖"
 652 PRINT AT 21,0;"▒▒▒▒▒▒▒▒"
 655 LET AJ=(INT ((RND)*100))/100
 656 LET D=30-C+AJ
 658 IF D<=0 THEN LET D=0
 660 PRINT AT 0,5;"DISTANCE ";D;" FEET"
 670 IF D=0 THEN PRINT AT 2,9;"NO JUMP"
 675 IF D>B THEN LET B=D
 680 LET L=L-1
 690 IF L=0 THEN GOTO 740
 700 FOR K=1 TO 30
 710 NEXT K
 720 CLS
 730 GOTO 5
 740 PRINT AT 0,5;"BIGGEST JUMP ";B;" FEET"
 745 GOTO 2000
 780 LET C=31
 790 GOTO 655
 800 LET T=0
 802 FOR L=1 TO 6
 803 LET N=30
 804 PRINT AT 21,0;A$
 805 PRINT AT 19,3;" ";AT 15,4;" ";AT 20,2;" ";AT 18,4;" ";AT 20,N;"▙ ";AT 19,N;"▖ ";AT 14,3;"▒";AT 15,3;"▛";AT 17,4;" ";AT 20,1;" ";AT 19,1;"▌";AT 19,2;"▀";AT 17,1;" ";AT 18,2;" ";AT 17,2;"▚";AT 20,5;" ";AT 20,4;"▙";AT 19,4;"▌";AT 18,3;"▙";AT 16,4;" ";AT 16,3;"█";AT 16,2;"▌"
 806 GOSUB 8000
 810 PRINT AT 20,N;"▙ ";AT 19,N;"▖ ";AT 20,4;" ";AT 20,3;"▙";AT 19,4;" ";AT 19,3;"▛";AT 18,3;"▙";AT 19,1;" ";AT 19,2;"▌";AT 16,3;"▙";AT 17,4;"▀";AT 16,2;"▖";AT 17,2;"▀"
 815 GOSUB 8000
 830 PRINT AT 20,N;"▙ ";AT 19,N;"▖ ";AT 20,3;" ";AT 20,1;"▙";AT 19,3;" ";AT 19,1;"▖";AT 19,1;"▖";AT 17,1;"▌";AT 17,2;" ";AT 18,2;"▖";AT 16,3;"▌";AT 19,2;"▀";AT 18,2;"▖";AT 16,2;"▞";AT 18,3;"▚";AT 17,3;"▛";AT 16,3;"▌";AT 15,3;"▛";AT 14,3;"▒";AT 19,4;"▚";AT 16,4;"▌";AT 20,4;" ";AT 20,5;"▙"
 835 GOSUB 8000
 836 GOTO 805
 840 PRINT AT 20,N;"▙ ";AT 19,N;"▖ ";AT 21,N;"";AT 18,2;" ";AT 19,1;" ";AT 16,3;"▙";AT 20,1;" ";AT 20,2;"▀";AT 19,2;"▄";AT 19,3;"▌";AT 18,3;"▛";AT 18,4;"▖";AT 19,4;"▌";AT 20,5;" ";AT 20,4;"▙";AT 17,1;" ";AT 17,2;"▀";AT 16,2;"▖";AT 17,4;"▀";AT 16,4;"▀";AT 15,4;"▖"
 850 PRINT AT 20,N-1;"▙ ";AT 19,N-1;"▖ ";AT 21,N-1;"";AT 20,2;" ";AT 16,2;" ";AT 17,2;" ";AT 20,3;"▙";AT 19,3;"▛";AT 19,2;"▌";AT 17,4;"▀";AT 15,4;"▖";AT 20,4;" ";AT 19,4;" ";AT 18,4;"▖";AT 18,3;"▙"
 860 PRINT AT 20,N-2;"▙ ";AT 19,N-2;"▖ ";AT 21,N-2;"";AT 20,3;"▚";AT 19,3;"▌";AT 19,2;" ";AT 18,3;"█";AT 18,4;"▀";AT 17,3;"▙";AT 17,4;"▖";AT 16,2;"▌";AT 16,3;"▌";AT 16,4;" ";AT 15,2;"▖";AT 15,3;"▙";AT 15,4;"▞";AT 14,3;"▒"
 870 PRINT AT 20,N-3;"▙ ";AT 19,N-3;"▖ ";AT 21,N-3;"";AT 18,2;"▛ ";AT 17,4;"▄▟";AT 16,2;"▀";AT 15,2;"▄"
 872 PRINT AT 15,4;" ";AT 16,4;"▚";AT 17,4;" ";AT 18,4;"▚";AT 19,5;"▀";AT 20,N-4;"▙ ";AT 19,N-4;"▖ ";AT 21,N-4;""
 875 PRINT AT 19,5;" ";AT 20,N-5;"▙ ";AT 19,N-5;"▖ ";AT 21,N-5;"";AT 17,5;" ";AT 18,2;" ";AT 20,3;"▚";AT 19,3;"▌";AT 19,2;"
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";AT 18,3;"■";AT 18,4;"■ ";AT 17,3;"■";AT 17,4;"■ ";AT 16,2;"■";AT 16,3;"■ ";AT 16,4;" ";AT 15,2;"■ ";AT 15,3;"■";AT 15,4;"■";AT 14,3;"■"
 880 PRINT AT 17,3;"■ ";AT 20,N-6;"■ ";AT 19,N-6;"■ ";AT 21,N-6;"■■■";AT 19,5;" ";AT 14,3;"■";AT 15,3;"■";AT 15,2;" ";AT 16,2;" ";AT 17,4;" ";AT 17,2;" ";AT 20,3;"■";AT 19,3;"■";AT 19,2;"■ ";AT 16,3;"■■";AT 15,4;"■ ";AT 20,4;" ";AT 19,4;" ";AT 18,4;"■ ";AT 18,3;"■"
 890 PRINT AT 17,3;"■";AT 16,3;"■";AT 20,0;" ";AT 19,0;" ";AT 21,0;"■■■";AT 20,3;" ";AT 18,2;" ";AT 19,1;" ";AT 16,3;"■";AT 20,1;" ";AT 20,2;"■ ";AT 19,2;"■";AT 19,3;"■ ";AT 18,3;"■";AT 18,4;"■";AT 19,4;"■ ";AT 20,5;" ";AT 20,4;"■";AT 17,1;" ";AT 17,2;"■";AT 16,2;"■";AT 17,4;"■ ";AT 16,4;"■ ";AT 15,4;"■"
 900 PRINT AT 20,0;" ";AT 19,0;" "
 902 NEXT L
 910 PRINT AT 0,5;"TIME ";T;"SECS"
 912 PAUSE 100
 920 GOTO 2024
1000 LET A$="■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■"
1001 FOR N=1 TO 20
1010 PRINT AT 0,5;"THE LONG JUMP "
1020 FOR S=1 TO 5
1025 NEXT S
1030 PRINT AT 0,5;"THE*LONG*JUMP*"
1035 NEXT N
1040 CLS
1045 RETURN
2000 LET TS=B*100
2002 PRINT AT 10,5;"POINT SO FAR ";TS
2004 PAUSE 100
2006 CLS
2009 GOTO 2500
2010 FOR S=1 TO 10
2012 PRINT AT 0,5;"400 METER HURDLES "
2013 FOR E=1 TO 5
2014 NEXT E
2018 PRINT AT 0,5;"400*METER*HURDLES*"
2020 NEXT S
2022 CLS
2023 GOTO 800
2024 LET TS=TS+((100-T)*100)
2030 CLS
2040 PRINT AT 0,0;"YOUR TOTAL POINTS WERE ";TS
2042 PRINT AT 2,0;"LONG JUMP ";B;"FEET";AT 4,0;"SHOT       ";DL;"FEET";AT 6,0;"100 METER ";T1;" SECS";AT 8,0;"400 METER ";T;" SECS"
2050 PRINT ,,"PRESS ""Y""TO RUN AGAIN",,,"PRESS ""S""TO STOP"
2060 IF INKEY$="Y" THEN GOTO 9010
2065 IF INKEY$="S" THEN STOP
2070 GOTO 2060
2500 FOR S=1 TO 10
2501 PRINT AT 0,5;"SHOT PUT"
2502 FOR E=1 TO 5
2503 NEXT E
2504 PRINT AT 0,5;"SHOT PUT"
2505 NEXT S
2506 LET C=0
2507 LET L=3
2508 LET D=0
2509 PRINT AT 21,0;A$
2510 PRINT AT 20,1;"■■  ■";AT 19,1;" ■■";AT 18,1;" ■■";AT 17,1;"O■■";AT 16,2;"■■"
2512 PRINT AT 2,5;"""S""TO START"
2513 IF INKEY$="S" THEN GOTO 2515
2514 GOTO 2513
2515 PRINT AT 20,1;"■■  ■";AT 19,1;" ■■";AT 18,1;" ■■";AT 17,1;"O■■";AT 16,2;"■■"
2516 GOSUB 100
2520 PRINT AT 20,1;"■■  ■ ";AT 19,1;" ■ ";AT 18,1;" ■";AT 17,1;"O■■ ";AT 16,2;"■ ■"
2521 GOSUB 100
2530 PRINT AT 20,1;"■ ■■  ";AT 19,1;" ■■";AT 18,1;" ■■";AT 17,1;"O■■";AT 16,2;"■■"
2531 GOSUB 100
2540 PRINT AT 20,1;" ■■■ ";AT 19,1;" ■■";AT 18,1;"  ■";AT 17,1;" ■ ";AT 16,2;"O■■";AT 15,3;"■■"
2541 GOSUB 100
2550 PRINT AT 20,2;"■ ";AT 19,2;" ■";AT 18,3;"■ ";AT 17,3;"■";AT 16,2;" O■ ";AT 15,3;"■ "
2551 GOSUB 100
2559 PRINT AT 20,2;"■ ";AT 19,2;" ■";AT 18,2;" ■ ";AT 17,2;" ■";AT 16,3;"■";AT 15,3;"■O"
2560 GOSUB 100
2561 PRINT AT 21,5;"■■■"
2562 IF INKEY$="T" THEN GOTO 2570
2563 FOR C=30 TO 1 STEP -1
2564 IF INKEY$="T" THEN GOTO 2570
2566 NEXT C
2570 PRINT AT 20,3;" ■";AT 19,2;" ■■ ";AT 18,3;"■";AT 17,2;" ■■";AT 16,3;" ■";AT 15,3;" ";AT 14,5;"O"
2572 LET AJ=(INT ((RND)*100))/100
2574 LET D=C+AJ
2576 PRINT AT 14,5;" ";AT 13,6;"O";AT 13,6;" ";AT 13,7;"O";AT 13,7;" ";AT 14,8;"O";AT 14,8;" ";AT 15,8;"O";AT 15,8;" ";AT 16,9;"O";AT 16,9;" ";AT 17,9;"O";AT 17,9;" ";AT 18,9;"O";AT 18,9;" ";AT 19,10;"O";AT 19,10;" ";AT 20,10;"O"
2578 PRINT AT 0,5;"■■■■■■■■■■■■";D;"■■■■"
2580 IF D>DL THEN LET DL=D
2582 LET L=L-1
2584 PAUSE 75
2585 IF L<=0 THEN GOTO 2590
2586 CLS
2587 GOTO 2508
2590 PRINT AT 0,5;"■■■■■■■■■■■■■■■■■■";DL;"■■■■"
2591 LET TS=TS+DL*100
2592 PRINT AT 10,0;"POINTS SO FAR ";TS
2593 PAUSE 100
2595 CLS
2700 FOR S=1 TO 10
2705 PRINT AT 0,5;"100*METERS"
2710 FOR E=1 TO 5
2715 NEXT E
2720 PRINT AT 0,5;"100 METERS"
2721 NEXT S
2722 LET T1=0
2725 LET L=40
2800 PRINT AT 21,0;A$;AT 20,1;"■■■■";AT 19,2;" ■■■ ";AT 18,3;"■■";AT 17,5;"■"
2810 PAUSE (INT (20*RND))+10
2822 PRINT AT 21,5;"GO"
2823 LET T1=T1+.25
2824 IF INKEY$="Z" THEN GOTO 2828
2826 GOTO 2823
2828 PRINT AT 21,5;"■■"
2829 LET L=L-1
2840 PRINT AT 21,5;"X"
2845 LET T1=T1+.25
2850 IF INKEY$="X" THEN GOTO 2870
2860 GOTO 2845
2870 PRINT AT 21,5;"■";AT 20,1;"■■  ";AT 19,2;"■■ ";AT 18,2;"■■ ";AT 17,2;" ■■";AT 16,4;"■ "
2871 LET L=L-1
2874 PRINT AT 21,5;"Z"
2876 LET T1=T1+.25
2878 IF INKEY$="Z" THEN GOTO 2880
2879 GOTO 2876
2880 PRINT AT 21,5;"■";AT 20,2;"■  ";AT 19,2;"■ ";AT 18,2;"■ ";AT 17,2;" ■ ";AT 16,2;"■ ";AT 15,3;"■ ";AT 14,3;"■"
2891 LET L=L-1
2892 IF L<=4 THEN GOTO 2940
2893 IF L<=30 THEN PRINT AT 20,L;"■ "
2900 PRINT AT 21,5;"X"
2905 LET T1=T1+.25
2910 IF INKEY$="X" THEN GOTO 2920
2915 GOTO 2905
2920 PRINT AT 21,5;"■";AT 20,3;" ";AT 19,2;"■ ■";AT 18,3;"■";AT 17,3;"■ ";AT 16,2;"■■";AT 15,3;"■■";AT 14,3;"■"
2921 LET L=L-1
2922 IF L<=4 THEN GOTO 2940
2930 IF L<=30 THEN PRINT AT 20,L;"■ "
2932 GOTO 2872
2940 LET AJ=(INT (RND)*100)/100
2945 PRINT AT 0,5;"TIME ";T1+AJ;"SECS"
2950 PAUSE 100
2952 LET TS=TS+((40-T1)*100)
2954 CLS
2960 GOTO 2010
7999 STOP
8000 LET N=N-1
8010 IF N=6 THEN GOTO 8030
8020 RETURN
8030 LET C=0
8031 IF INKEY$="J" THEN LET T=T+3
8035 PRINT AT 21,N;"■■■"
8040 FOR C=1 TO 10
8045 IF INKEY$="J" THEN GOTO 8055
8050 NEXT C
8055 LET AJ=(INT ((RND)*100))/100
8056 LET T=T+C+10+AJ
8060 GOTO 840
9000 SAVE "OLYMPI■"
9010 LET DL=0
9012 GOTO 1
```



GAS BILL

GAS BILL is a useful little program to calculate the cost of keeping yourself warm and well-fed through the winter. The program requires you to enter the number of units used and the standing charge.

Of course, our readers would never dream of questioning the great Gas Board computer which sends out the bills, but many might like to reassure their nearest and dearest that the horrible figures are indeed the correct ones.

Gas Bill was written by J Ashburner of St Helens on Merseyside, and runs on the 16K Spectrum.

The program uses our special abbreviations for graphics characters so please read the instructions on the first page of Program Printout.

```
   5 POKE 23609,50: POKE 23658,8
  10 BORDER 0: PAPER 0: INK 7: I
NVERSE 0: OVER 0: BRIGHT 1: FLAS
H 0: CLS
  20 PRINT AT 2,5;"GAS BILL CALC
ULATIONS(11,sp)BY(2*sp)T.G.ASHBU
RNER AND(15*sp)J.M.ASHBURNER"
  21 PRINT AT 20,10; INVERSE 1;"
PRESS ANY KEY": INVERSE 0
  22 PLOT 50,30: DRAW 155,0: DRA
W 0,100: DRAW -155,0: DRAW 0,-10
0
  23 PLOT 50,80: DRAW 80,0: DRAW
 0,50
  24 FOR n=60 TO 120 STEP 15: CI
RCLE n,110,7: PLOT n,110: DRAW 5
,5: NEXT n
  25 PLOT 140,85: DRAW 50,0: DRA
W 0,40: DRAW -50,0: DRAW 0,-40
  26 PLOT 170,90: DRAW 5,30: DRA
W 3,0: DRAW -5,-30: DRAW -3,0: P
RINT AT 7,18;"50p": PRINT AT 10,
7; INVERSE 1;"537856 X": INVERSE
 0
  40 PAUSE 1: PAUSE 0
  50 CLS
  60 LET Z=1.032: LET Y=0.335
  65 PRINT "WHAT IS YOUR REFEREN
CE NO ?(5*sp)(This is found at t
he top of thebill)"
  70 INPUT  LINE K$
  75 PRINT AT 5,0;K$
  90 PRINT AT 21,9; FLASH 1;"PRE
SS ANY KEY"
 100 PAUSE 1: PAUSE 0
 110 CLS
 200 PRINT "TYPE IN PRESENT METE
R READING .."
 210 INPUT A
 215 IF A<1 THEN  GO TO 110
 220 PRINT AT 5,5;A
 230 PRINT AT 10,0;"TYPE IN PREV
IOUS READING.."
 240 INPUT B
 245 IF B>A THEN  GO TO 230
 250 PRINT AT 15,5;B
 260 PRINT AT 21,9; FLASH 1;"PRE
SS ANY KEY"
 270 PAUSE 1: PAUSE 0
 275 CLS
 280 PRINT "WHAT IS YOUR STANDIN
G CHARGE ?"
 290 INPUT W
 300 IF W<1 THEN  GO TO 270
 301 PRINT AT 5,5;W
 310 PRINT AT 10,0;"HOW MANY PEO
PLE ARE SHARING THE BILL ?"
 320 INPUT X
 325 IF X<1 OR X>20 OR X<>INT X
THEN  GO TO 310
 330 PRINT AT 15,5;X
 340 PRINT AT 21,9; FLASH 1;"PRE
SS ANY KEY"
 350 PAUSE 1: PAUSE 0
 355 CLS
 360 PRINT "REF. NO. ";K$
 370 PRINT "(32*sp)"
 376 PRINT
 380 PRINT "PRESENT........";A
 390 PRINT
 400 PRINT "PREVIOUS.......";B
 420 PRINT
 430 PRINT "UNITS USED.....";A-B
 435 PRINT
 436 PRINT "THERMS.........";(A-
B)*Z
 440 PRINT "____________________
____________"
 450 PRINT
 460 PRINT "STAND.CHGE.....£";W
 470 PRINT
 480 PRINT "NO OF PEOPLE...";X
 490 PRINT
 491 LET C=(((A-B)*Z*Y)+W)
 492 LET C=C*100: LET C=INT C: L
ET C=C/100
 495 PRINT "TOTAL CHARGE...£";C
 500 PRINT
 502 LET Q=C/X: LET Q=Q*100: LET
 Q=INT Q: LET Q=Q/100
 510 PRINT "COST PER(24*sp)PERSO
N.........£";Q
 520 PRINT "____________________
____________"
 530 PRINT )0;"(2*sp)(R)-RE-RUN
(S)-STOP (C)-COPY"
 540 IF INKEY$<>"" THEN  GO TO 5
40
 550 IF INKEY$="R" OR INKEY$="r"
 THEN  GO TO 50
 555 IF INKEY$="C" OR INKEY$="c"
 THEN  COPY
 560 IF INKEY$="S" OR INKEY$="s"
 THEN  GO TO 570
 565 GO TO 550
 570 CLS
```

ON THE

TAKE YOUR struggling rock band to the dizzying heights of an international tour in **On The Road,** a complex simulation of the heartache and happiness of a career in the music industry.

At each stage you are presented with a list of options. You may choose to record an album or arrange a live tour. You band has a financial and status rating, and those must be high enough for your decision.

When you play live, you will only be allowed a limited number of gigs at a single venue, so plan carefully. Venues are described in terms of Audience quality (AQ) and variability (AV). The AV figure represents the degree of criticism you might expect, but the figures may not always tell the whole story.

On The Road was a runner-up in the 1984 Cambridge Awards competition, and was written by Ges and Hilary Taylor.

The program uses our special instructions for graphics characters, so please read the instructions on the first page of Program Printout before entering the program.




```
   5 CLEAR 65535: GO TO 1000
  10 GO TO 1450
 100 IF INKEY$<>"" THEN  GO TO 1
00
 101 IF INKEY$="" THEN  GO TO 10
1
 102 RETURN
 200 LET x=INT (RND*(u-1)+1)+1:
RETURN
 301 LET y=(2^su)+4000
 302 LET y=y+1000+(20*ss): RETUR
N
 405 PRINT v$(i);TAB 20;r(i);TAB
 23;a(i);TAB 25;INT i(i);TAB 31;
b(i): RETURN
 505 PRINT AT 0,11;"TOUR VENUES"
: PRINT
 507 PRINT AT 2,0;"(4*sp)VENUE(1
0*sp)AQ AV(2*sp)£(4*sp)B"
 510 FOR i=L1 TO L2
 515 FOR j=1 TO vb
 520 IF c(j)=i THEN  INVERSE 1:
GO SUB 400: INVERSE 0: GO TO 535
 525 NEXT j
 527 IF v(i)=mt THEN  INVERSE 1:
 GO SUB 400: INVERSE 0: GO TO 53
5
 530 GO SUB 400
 535 NEXT i
 540 PRINT AT 18,0;"Select up to
 5 venues for tour."
 550 PRINT AT 19,0;"ENTER 0 if s
election complete."
 555 PRINT AT 20,0;"ENTER 999 fo
r more choice.": RETURN
 570 PRINT AT 21,5; FLASH 1;"VEN
UE NOT AVAILABLE"
 575 GO TO 585
 580 PRINT AT 21,5; FLASH 1;"VEN
UE ALREADY BOOKED"
 590 PAUSE 100
 595 PRINT AT 21,0;"(32*sp)"
 605 INPUT v
 610 IF v=0 THEN  GO TO 3390
 615 IF v=999 THEN  RETURN
 620 IF v<L OR v>U THEN  GO TO 5
70
 625 FOR j=1 TO vb
 630 IF c(j)=v THEN  GO TO 570
 635 NEXT j
 640 FOR j=1 TO 5
 645 IF d(j)=v THEN  GO TO 580
 650 NEXT j
 660 LET v(v)=v(v)+1: IF v(v)=mt
+1 THEN  GO TO 570
 665 LET gt=gt+1: LET vt=vt+1: L
ET d(vt)=v
 685 LET nss=nss+((r(v)-RND*a(v)
)*(4-b(v)))
 687 IF vt>=5 THEN  GO TO 3390
 690 GO TO 605
 695 RETURN
 705 LET A1=INT (RND*((ti/25)+ss
/3))
 715 LET A3=(ti*ss)/10.25
 720 PRINT AT 0,7;"FINAL STUDIO
COSTS": PRINT : PRINT
 725 PRINT "ORIGINAL BOOKING FEE
S(4*sp)"
 730 PRINT AT 4,28;"£"
 735 PRINT AT 5,2;S$(S);AT 5,28;
S(S)*ti
 740 PRINT AT 6,2;p$(p);AT 6,28;
p(p)*ti
 745 PRINT : PRINT : PRINT "ADDI
TIONAL FEES": PRINT
 750 PRINT AT 11,2;"Extra studio
 time ";A1;" hrs";AT 11,28;INT (
s(s)*A1)
 755 PRINT AT 12,2;"Extra mixing
 time ";INT (A1/1.25);" hrs";AT
12,28;INT (p(p)*(A1/1.25))
 760 PRINT : PRINT : PRINT "SUND
RY EXPENSES": PRINT AT 15,28;INT
 A3: PRINT : PRINT
 765 LET cost=(s(s)*ti)+(p(p)*ti
)+INT (A1*ti)+INT ((A1/1.25)*ti)
+INT A3
 770 PRINT AT 18,7;"TOTAL COSTS
£";cost
 775 PRINT : PRINT : GO SUB 7000
: RETURN
 805 PRINT AT 21,0;"COPY?": GO S
UB 100
 810 IF INKEY$="Y" OR INKEY$="y"
 THEN  PRINT AT 21,0;"(6*sp)": C
OPY : RETURN
 820 RETURN
1000 RANDOMIZE : BORDER 7: PAPER
 7: INK 9: CLS
1006 POKE 23609,40: POKE 23658,8
1010 DIM b$(30): DIM a$(30)
1020 LET f=0: LET mo=50: LET we=
1: LET ss=0
1030 LET ct=0: DIM l$(5,7): LET
aw=0
1035 LET HH=0: LET la=0: LET na=
1160
1040 DIM s$(5,15): DIM p$(5,15):
 DIM t$(5,15): DIM q$(5,15): DIM
 s(8): DIM p(8): DIM t(16): DIM
q(16)
1050 FOR i=1 TO 5: READ l$(i): N
EXT i
1055 FOR i=1 TO 5: READ s$(i): N
EXT i
1060 FOR i=1 TO 5: READ p$(i): N
EXT i
1065 FOR i=1 TO 5: READ s(i): NE
XT i
1070 FOR i=1 TO 5: READ p(i): NE
XT i
1075 FOR i=1 TO 10: READ t(i): N
EXT i
1080 FOR i=1 TO 10: READ q(i): N
EXT i
1090 LET at=0: LET gt=0
1100 DIM v$(180,19): DIM v(180):
 DIM a(180): DIM r(180): DIM b(1
80): DIM w(180): DIM i(180)
1110 FOR i=1 TO 180: READ v$(i):
 NEXT i
```

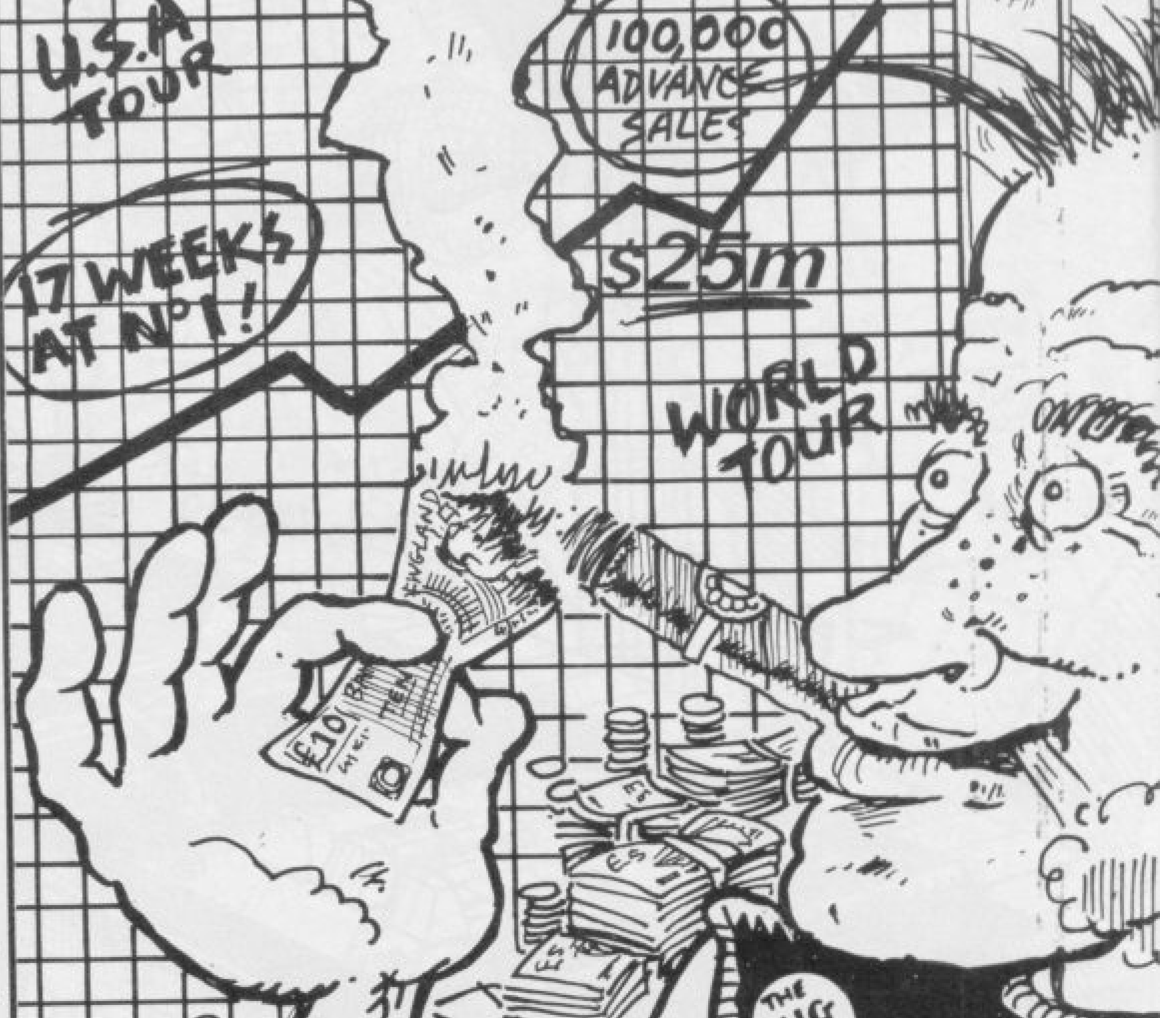
ROAD




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1130 FOR i=1 TO 180: LET a(i)=0:
 NEXT i
1135 FOR i=1 TO 180: READ r(i):
NEXT i
1142 FOR i=1 TO 180: READ w(i):
NEXT i
1155 CLS : GO SUB na: GO TO 1390
1160 PRINT AT 0,10;"NAME THE BAN
D"
1165 PRINT : PRINT B$
1170 PRINT : PRINT "(3*sp)Type i
n the name you would(6*sp)like f
or your band.(13*sp)Press ENTER
when finished."
1180 PRINT AT 10,0;" -----------
-------------------- "
1190 FOR i=1 TO 30
1200 GO SUB 100
1210 LET b$(i)=INKEY$
1220 IF CODE b$(i)=13 THEN  LET
b$=b$( TO i-1): GO TO 1250
1230 PRINT AT 10,i;b$(i)
1240 NEXT i
1250 PRINT AT 21,0;"Is this corr
ect? (Y/N)"
1260 GO SUB 100
1270 LET y$=INKEY$
1280 IF y$="N" OR y$="n" THEN  P
RINT AT 21,0;"(22*sp)": GO TO 11
80
1290 IF y$<>"Y" AND y$<>"y" THEN
  GO TO 1260
1385 RETURN
1390 LET ra =((RND*41)+10)/10
1392 PRINT AT 21,0;"(22*sp)"
1394 PRINT AT 18,0;"Are you usin
g a PRINTER? (Y/N)"
1395 LET pz=0: GO SUB 100
1396 IF INKEY$="Y" OR INKEY$="y"
 THEN  LET pz=1
1400 PRINT AT 18,0;"How much ass
istance do you want?": PRINT : P
RINT "(8*sp)1 (min) - 5 (max)"
1405 GO SUB 100
1410 LET sk=VAL INKEY$
1415 IF sk<1 OR sk>5 THEN  GO TO
 1405
1420 LET ss=ra*sk
1425 LET stat=ss
1430 PRINT AT 15,0;"This dynamic
, exciting new band is going ON
THE ROAD with a(14*sp)STATUS of
";INT ss;"%"
1435 PRINT AT 18,0;"(32*sp)": PR
INT AT 20,0;"(3*sp)PRESS ANY KEY
 TO CONTINUE(4*sp)"
1440 PAUSE 10: PAUSE 0: CLS
1451 BORDER 7: PAPER 7: CLS
1452 LET stu=1900: LET liv=3000:
 LET fin=1600: LET sav=1550: LET
 end=7500
1455 PRINT AT 0,11;"ON THE ROAD"
: PRINT : PRINT
1460 PRINT AT 3,0;"1(2*sp)INTO T
HE STUDIO"
1465 PRINT AT 5,0;"2(2*sp)LIVE G
IGS"
1468 PRINT AT 7,0;"3(2*sp)VENUE
SCAN"
1470 PRINT AT 9,0;"4(2*sp)FINANC
IAL REPORT"
1477 PRINT AT 11,0;"5(2,sp)SCORE
"
1478 PRINT AT 13,0;"6(2*sp)SAVE
GAME"
1480 PRINT AT 20,0;"Please selec
t option required."
1485 GO SUB 100
1490 LET y$=INKEY$: CLS
1495 IF y$="1" THEN  GO SUB stu:
 GO TO 1450
1500 IF y$="2" THEN  GO TO liv
1503 IF y$="3" THEN  GO SUB 4500
: GO TO 1450
1505 IF y$="4" THEN  GO SUB fin:
 GO TO 1450
1512 IF y$="5" THEN  GO TO end
1515 IF y$="6" THEN  GO SUB sav:
 GO TO 1450
1520 GO TO 1450
1552 BORDER 7: PAPER 7: CLS
1555 PRINT AT 10,0;"SAVE 'ON THE
 ROAD'."
1560 SAVE "road" LINE 10
1565 PRINT AT 10,0;"VERIFY 'ON T
HE ROAD'."
1570 VERIFY "road"
1575 CLS : RETURN
1601 BORDER 6: PAPER 6: CLS
1602 IF mo<=-1000 THEN  PRINT AT
 10,8; FLASH 1;"YOU ARE BANKRUPT
!": PAUSE 200: STOP
1605 IF ss<=0 THEN  PRINT AT 10,
0;"The music press vote you this
(3*sp)year's worst band and you
decideto split.": PAUSE 200: STO
P
1610 IF f=1 THEN  GO TO 1630
1620 IF mo>=1000000 THEN  LET ss
=ss+1: LET f=1
1630 IF ss<100 THEN  GO TO 1670
1640 IF f=1 THEN  GO TO 1660
1650 IF mo<1000000 THEN  LET ss=
99: GO TO 1670
1660 PRINT AT 8,9; FLASH 1;"CONG
RATULATIONS": PRINT : PRINT "You
 have achieved stardom and(3*sp)
can retire to a life of(9*sp)lux
ury!"
1662 PAUSE 300: CLS : GO SUB 168
0: STOP
1680 PRINT AT 0,8;"FINANCIAL REP
ORT"
1690 PRINT AT 2,1;B$
1700 PRINT : PRINT "Weeks ON THE
 ROAD......(2*sp)";INT we
1705 PRINT "Gigs played.........
...(2*sp)";gt
1710 PRINT : PRINT "Albums made.
..........(2*sp)";at
1715 IF at=0 THEN  GO TO 1725
1720 PRINT "Current album name..
...(2*sp)"'a$
1725 PRINT : PRINT "Initial stat
us.........(2*sp)";INT stat;"%"
1730 PRINT "Current status......
...(2*sp)";INT ss;"%"
1735 PRINT "(Actual status......
...(2*sp)";INT (ss*10+.5)/10;"%)
"
1740 PRINT : PRINT "Bank balance
........(2*sp)£";INT (mo*100+.5)
/100
1745 IF pz=1 THEN  GO SUB 800
1795 PRINT AT 21,0;"(3*sp)PRESS
ANY KEY TO CONTINUE(4*sp)"
1796 PAUSE 10: PAUSE 0: CLS : RE
TURN
1991 BORDER 4: PAPER 4: CLS
1995 IF INT mo>=1000 THEN  GO TO
 1997
1996 GO TO 2010
1997 LET cost=0: LET nmo=0
2000 IF aw=0 THEN  GO TO 2004
2002 IF we>aw THEN  GO TO 2004
2003 GO TO 2010
2004 IF ct= 1 THEN  GO TO 2200
2005 IF ss>=10 THEN  GO TO 2100
2010 PRINT "(11*sp)STUDIO NEWS":
 PRINT : PRINT
2015 PRINT "Your agent understan
ds your(5*sp)enthusiasm to recor
d an album,"
2020 IF at>0 THEN  PRINT "follow
ing the release of"''a$: PRINT
2025 PRINT "but advises, at pres
ent, such anundertaking would be
 detrimentalto the band's progre
ss."
2030 PRINT AT 21,0;"    PRESS ANY
 KEY TO CONTINUE": PAUSE 50: PAU
SE 0: CLS : RETURN
2105 LET j=INT (RND*5)+1: LET cc
=INT (RND*3)+1: LET nmo=((8000*(
(ss-stat)/we))+(ss*ss))*cc
2106 LET c=0: LET nmo=nmo+INT (R
ND*1301)+200
2110 PRINT "(7*sp)RECORDING CONT
RACT(7*sp)": PRINT : PRINT
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continued on page 128

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2115 PRINT "Your agent has negot
iated(7*sp)a contract on your be
half.": PRINT
2120 PRINT "LABEL(5*sp)DEAL(5*sp
)NO.RECORDS"
2125 PRINT AT 8,0;l$(j);AT 8,10;
"£";INT nmo;AT 8,24;cc
2130 PRINT AT 21,0;"Do you accep
t this offer? (Y/N)"
2135 GO SUB 100
2140 LET y$=INKEY$
2145 IF y$="n" OR y$="N" THEN  L
ET aw=we+(INT (RND*5)+3): PRINT
AT 20,0;"Your agent will now res
ume(6*sp)talks with the record c
ompanies.": PAUSE 10: PAUSE 300:
 CLS : RETURN
2150 IF y$<>"y" AND y$<>"Y" THEN
 GO TO 2135
2151 LET ct=1: LET mo=mo+nmo: LE
T nmo=0
2152 PRINT AT 20,0;"Do you wish
to go straight"'"into the studio
? (Y/N)(10*sp)"
2153 GO SUB 100: IF INKEY$="y" O
R INKEY$="Y" THEN  CLS : GO TO 2
155
2154 CLS : RETURN
2155 LET nmo=0
2200 IF INT ss>=0 AND INT ss<=5
THEN  LET t=2: LET q=1
2205 IF INT ss>=6 AND INT ss<=15
 THEN  LET t=3: LET q=2
2210 IF INT ss>=16 AND INT ss<=3
0 THEN  LET t=3: LET q=3
2215 IF INT ss>=31 AND INT ss<=5
0 THEN  LET t=4: LET q=3
2220 IF INT ss>=51 AND INT ss<=6
0 THEN  LET t=4: LET q=4
2225 IF INT ss>=61 THEN  LET t=5
: LET q=5
2230 PRINT AT 0,9;"INTO THE STUD
IOS": PRINT : PRINT "STUDIOS"
2235 FOR i=1 TO t: PRINT i;"(2*s
p)";s$(i);" £";s(i);" hour": NEX
T i
2240 PRINT "PRODUCERS"
2245 FOR i=1 TO q: PRINT i;"(2*s
p)";p$(i);" £";p(i);" hour": NEX
T i
2250 PRINT AT 20,0;"Enter the nu
mber of the studio(2*sp)you wish
 to use."
2255 INPUT s
2257 IF S<1 OR S>t THEN  GO TO 2
255
2260 PRINT AT 15,0;"STUDIO(3*sp)
";s$(s)
2265 PRINT AT 20,0;"Enter the nu
mber of the produceryou wish to
use."
2270 INPUT p
2275 IF p<1 OR p>q THEN  GO TO 2
270
2280 PRINT AT 16,0;"PRODUCER ";p
$(p)
2285 PRINT AT 18,0;"STUDIO TIME"
;AT 19,0;"You should book betwee
n(9*sp)10 & 100 hours.(17*sp)";A
T 21,0;"Enter required number of
 hours."
2290 INPUT ti
2292 LET ti=INT ti
2295 IF ti<10 THEN  GO TO 2290
2305 IF ti>=10 AND ti<=49 THEN
LET t1=5: LET t2=10
2310 IF ti>=50 AND ti<=80 THEN
LET t1=10: LET t2=25
2320 IF ti>=81 THEN  LET t1=30:
LET t2=50
2325 PRINT AT 21,0;"(32*sp)"
2330 PRINT AT 21,0;"HOURS BOOKED
 ";INT ti
2331 PRINT #1;"(3*sp)PRESS ANY K
EY TO CONTINUE"
2332 PAUSE 0: CLS
2334 PRINT AT 0,9;"IN THE STUDIO
"
2335 PRINT AT 3,6; INK 7; PAPER
0; FLASH 1;"ALBUM NOW RECORDING"
2337 INK 0: FOR i=50 TO 25 STEP
```




```
-3: CIRCLE 115,75,i: NEXT i
2338 INK 7: FOR i=20 TO 5 STEP -
1: CIRCLE 115,75,i: NEXT i: INK
9
2340 PAUSE 150: GO SUB 700
2343 LET u=t(s*2): LET l=t(s*2)-
1: GO SUB 200: LET a=x
2345 LET u=q(p*2): LET l=q(p*2)-
1: GO SUB 200: LET ba=x
2350 LET u=t2: LET l=t1: GO SUB
200: LET k=x
2355 LET su=(a+ba+k)/10
2356 LET su=su+ss/100
2358 IF su>17 THEN  LET su=17
2363 LET mo=mo-cost
2365 LET we=we+1
2370 LET aw=we+(INT (RND*6)+12)
2373 LET at=at+1
2375 LET c=c+1
2380 IF c>=cc THEN  LET ct=0: LE
T AW=AW-4
2385 IF su<=5 THEN  LET u=1: LET
 l=0
2390 IF su>5 AND Su<=7 THEN  LET
 u=125: LET l=25
2395 IF su>7 AND Su<=9 THEN  LET
 u=175: LET l=75
2400 IF su>9 AND Su<=11 THEN  LE
T u=225: LET l=125
2405 IF su>11 AND Su<=13 THEN  L
ET u=275: LET l=175
2410 IF su>13 AND Su<=15 THEN  L
ET u=325: LET l=225
2415 IF su>15 AND Su<=17 THEN  L
ET u=375: LET l=275
2420 IF su>17 AND Su<=19 THEN  L
ET u=425: LET l=325
2425 IF su>19 AND Su<20 THEN  LE
T u=450: LET l=375
2426 IF su=20 THEN  LET u=500: L
ET l=400
2428 IF su>18 THEN  LET su=18
2430 GO SUB 200: LET nss=x/100
2435 GO SUB 300: LET nmo=y
2440 LET mo=mo+nmo: LET ss=ss+ns
s
2500 PRINT AT 0,9;"ALBUM RELEASE
"
2505 PRINT : PRINT "(2*sp)Your a
lbum has been recorded(4*sp)and
is ready for release.(7*sp)All t
hat remains is for you(5*sp)to g
ive it a title."
2510 PRINT : PRINT "Type in the
name you would(6*sp)like for you
r album.(12*sp)Press 'ENTER' whe
n finished."
2520 PRINT AT 12,0;" -----------
------------------ "
2530 FOR i=1 TO 30
2540 IF INKEY$<>"" THEN  GO TO 2
540
2545 IF INKEY$="" THEN  GO TO 25
45
2550 LET a$(i)=INKEY$
2555 IF CODE A$(i)=13 THEN  LET
A$=A$( TO i-1): GO TO 2570
2560 PRINT AT 12,i;a$(i)
2565 NEXT i
2570 PRINT AT 21,0;"Is this corr
ect? (Y/N)"
2575 GO SUB 100
2580 IF INKEY$="N" OR INKEY$="n"
 THEN  PRINT AT 21,0;"(32*sp)":
GO TO 2500
2590 CLS
2600 PRINT AT 0,10;"ADVANCE SALE
S": PRINT
2605 PRINT "Record shops through
out Britain have made advance or
ders for(4*sp)your latest album,
"''a$
2610 PRINT : PRINT "RECORDING CO
STS £";INT cost
2620 PRINT : PRINT "ADVANCE SALE
S   £";INT nmo
2630 IF nmo>=cost THEN  PRINT :
PRINT "PROFIT(10*sp)£";INT (nmo-
cost)
2635 IF nmo<cost THEN  PRINT : P
RINT "LOSS(12*sp)£";INT (cost-nm
o)
2640 PRINT : PRINT "Please wait
while news of your(2*sp)success
spreads nationwide."
2641 IF nmo-cost<0 THEN  GO TO 2
```




```
650
2642 FOR i=1 TO 180
2643 IF nmo-cost<50000 THEN  LET
 r(i)=r(i)+2
2644 IF nmo-cost>=50000 THEN  LE
T r(i)=r(i)+(INT (RND*3)+2)
2645 IF r(i)>=15 THEN  LET r(i)=
15
2646 NEXT i
2648 PRINT AT 21,0;"(3*sp)PRESS
ANY KEY TO CONTINUE(4*sp)"
2650 PAUSE 0: GO SUB 5000
2652 CLS : RETURN
3002 BORDER 5: PAPER 5: CLS
3010 PRINT AT 0,11;"LIVE GIGS":
PRINT
3015 PRINT "(2*sp)TOUR(20*sp)STA
TUS"
3020 PRINT : PRINT "1 PUBS & CLU
BS(13*sp)0-18"
3021 PRINT : PRINT "2 COLLEGES(1
6*sp)15-45"
3022 PRINT : PRINT "3 BRITAIN(17
*sp)25-100"
3023 PRINT : PRINT "4 EUROPE(18*
sp)60-100"
3024 PRINT : PRINT "5 USA & JAPA
N(13*sp)45-100"
3025 PRINT AT 16,0;"Your status
is ";INT ss
3030 PRINT AT 18,0;"Select tour
required."
3035 PRINT AT 20,0;"(32*sp)";AT
21,0;"(32*sp)"
3037 GO SUB 100
3040 LET y$=INKEY$
3043 PRINT AT 20,0;B$;AT 21,0;"a
re going.....ON THE ROAD!"
3045 IF y$="1" AND INT ss<=18 TH
EN  GO TO 3080
3050 IF y$="2" AND INT ss>=15 AN
D INT ss<=45 THEN  GO TO 3095
3055 IF y$="3" AND INT ss>=25 AN
D INT ss<=100 THEN  GO TO 3110
3060 IF y$="4" AND INT ss>=60 AN
D INT ss<=100 THEN  GO TO 3125
3065 IF y$="5" AND INT ss>=45 AN
D INT ss<=100 THEN  GO TO 3140
3070 GO TO 3035
3080 LET E=1: LET mt=5: LET xx=4
: LET yy=5: LET zz=.25: LET uu=0
: LET uu=2 AND ss>=10: LET uu=uu
+2: LET pp=8
3085 LET bx=1: LET L=1: LET U=40
3090 GO TO 3155
3095 LET yy=0: LET mt=5: LET xx=
4: LET yy=.5 AND ss>=21: LET yy=
yy+3: LET zz=.75: LET uu=1: LET
pp=20
3100 LET bx=2: LET L=41: LET U=8
0
3105 GO TO 3155
3110 LET xx=3.5: LET yy=8: LET z
z=1.5: LET uu=1: LET pp=55
3111 IF HH=0 THEN  LET MT=8: GO
TO 3115
3112 IF HH=1 THEN  LET MT=10
3115 LET bx=3: LET L=81: LET U=1
20
3120 GO TO 3155
3125 LET mt=3: LET xx=3: LET yy=
10: LET zz=2: LET uu=30: LET pp=
60
3130 LET bx=4: LET L=121: LET U=
150
3135 GO TO 3155
3140 LET mt=3: LET xx=4: LET yy=
40: LET zz=2: LET uu=70: LET pp=
70
3145 LET bx=5: LET L=151: LET U=
180
3155 LET vt=0: LET bil=0: LET we
=we+1: LET nss=0: LET inc=0: LET
 kost=0: DIM c(5): DIM d(5)
3170 FOR i=L TO U
3175 IF bx=1 THEN  LET b(i)=1
3180 IF bx=2 AND INT ss>=15 AND
INT ss<=20 THEN  LET b(i)=2
3185 IF bx=2 AND INT ss>=21 AND
INT ss<=35 THEN  LET b(i)=INT (R
ND*2)+1
3190 IF bx=2 AND INT ss>=36 AND
INT ss<=45 THEN  LET b(i)=1
3194 IF bx=3 AND INT ss>=25 AND
INT ss<=29 THEN  LET b(i)=3
3195 IF bx=3 AND INT ss>=30 AND
INT ss<=40 THEN  LET b(i)=INT (R
ND*2)+2
3200 IF bx=3 AND INT ss>=41 AND
INT ss<=59 THEN  LET b(i)=INT (R
ND*3)+1
3205 IF bx=3 AND INT ss>=60 AND
INT ss<=63 THEN  LET b(i)=2
3210 IF bx=3 AND INT ss>=64 AND
INT ss<=89 THEN  LET b(i)=INT (R
ND*2)+1
3215 IF bx=3 AND INT ss>=90 AND
INT ss<=100 THEN  LET b(i)=1
3220 IF bx=4 AND INT ss>=60 AND
INT ss<=75 THEN  LET b(i)=2
3225 IF bx=4 AND INT ss>=76 AND
INT ss<=90 THEN  LET b(i)=INT (R
ND*2)+1
3230 IF bx=4 AND INT ss>=91 AND
INT ss<=100 THEN  LET b(i)=1
3234 IF bx=5 AND INT ss>=45 AND
INT ss<=52 THEN  LET b(i)=3
3235 IF bx=5 AND INT ss>=53 AND
INT ss<=69 THEN  LET b(i)=INT (R
ND*2)+2
3240 IF bx=5 AND INT ss>=70 AND
INT ss<=89 THEN  LET b(i)=INT (R
ND*2)+1
3245 IF bx=5 AND INT ss>=90 AND
INT ss<=100 THEN  LET b(i)=1
3250 NEXT i
3260 FOR i=L TO U
3265 LET i(i)=(w(i)*(xx-b(i)))+(
((r(i)+2)*(INT ss-pp))/2)
3270 NEXT i
3273 CLS
3325 LET vb=INT (RND*5)+1
3330 FOR i=1 TO vb
3335 GO SUB 200
3340 LET c(i)=x
3345 NEXT i
3348 LET l1=L: LET l2=L+14
3350 GO SUB 500: GO SUB 600
3355 LET l1=L+15: LET l2=L+29
3360 GO SUB 500: GO SUB 600
3365 IF bx=4 OR bx=5 THEN  GO TO
 3347
3370 LET l1=L+30: LET l2=L+39
3375 GO SUB 500
3380 FOR i=13 TO 17: PRINT AT i,
0;"(32*sp)": NEXT i
3383 GO SUB 600
3385 GO TO 3347
3390 IF vt>0 THEN  GO TO 3435
3395 CLS
3400 PRINT AT 0,5;"WEEK'S GIGS C
ANCELLED"
3410 PRINT : LET tcc=20*INT ss
3420 PRINT "Loss of revenue(5*sp
)£";tcc
3423 LET mo=mo-tcc
3425 PAUSE 200: CLS
3430 GO TO 1450
3440 FOR i=1 TO vt
3445 LET inc=inc+i(d(i))
3450 NEXT i
3458 IF NOT bx=1 THEN  GO TO 346
2
3460 LET kost=(vt*ss*ss)/(yy+(ss
*E/20))+(ss*uu)+((RND*76)+50)
3461 GO TO 3465
3462 LET kost=(vt*ss*yy)+(ss*uu)
+((RND*100)+50)
3470 FOR i=1 TO vt
3475 LET bil=bil+b(d(i))
3477 IF bil>9 THEN  LET bil=9
3480 NEXT i
3485 LET nss=nss/((bil+1)*25)
3490 CLS
3495 PRINT AT 0,10;"ON THE ROAD"
: PRINT
3500 PRINT "H.M.G. PRODUCTIONS p
resents": PRINT : PRINT b$: PRIN
T
3505 PRINT "live on tour at :-"
3510 FOR i=1 TO vt
3515 PRINT : PRINT "(3*sp)";v$(d
(i))
3520 NEXT i
3523 PRINT AT 21,0;"(3*sp)PRESS
ANY KEY TO CONTINUE"
3525 PAUSE 0
3530 CLS
3540 GO SUB 4000
3570 CLS
3575 PRINT AT 0,10;"TOUR REPORT"
: PRINT
3620 PRINT : PRINT "TOTAL TOUR I
NCOME(3*sp)£";INT inc
3625 PRINT "TOTAL TOUR COSTS(4*s
p)£";INT kost
3630 IF INT inc-INT kost<0 THEN
 PRINT "LOSS(16*sp)£";INT inc-IN
T kost: LET ss=ss-zz: GO TO 3640
3635 PRINT "PROFIT(14*sp)£";INT
inc-INT kost
3640 LET low=INT (RND*2)
3642 IF low=1 THEN  GO TO 3685
3643 PRINT : PRINT
3645 PRINT "You are advised that
 these(6*sp)venues may not come
up to(7*sp)expectation on future
 tours."
3646 PRINT
3655 FOR i=1 TO vt
3658 IF bx=1 THEN  LET j=INT (RN
D*80)+1
3660 IF bx=2 THEN  LET j=INT (RN
D*80)+41
3661 IF bx=3 THEN  LET j=INT (RN
D*70)+81
3662 IF bx=4 OR bx=5 THEN  LET j
=INT (RND*100)+81
3670 LET a(j)=a(j)+INT (RND*3)
3672 IF a(j)>5 THEN  LET a(j)=5
3675 PRINT v$(j)
3680 NEXT i
3690 PRINT AT 18,0;"(4*sp)Your f
inances are being(5*sp)calculate
d by HMG productions.(13*sp)PLEA
SE WAIT"
3700 LET ss=ss+nss: LET mo=mo+(i
nc-kost)
3707 FOR i=L TO U
```

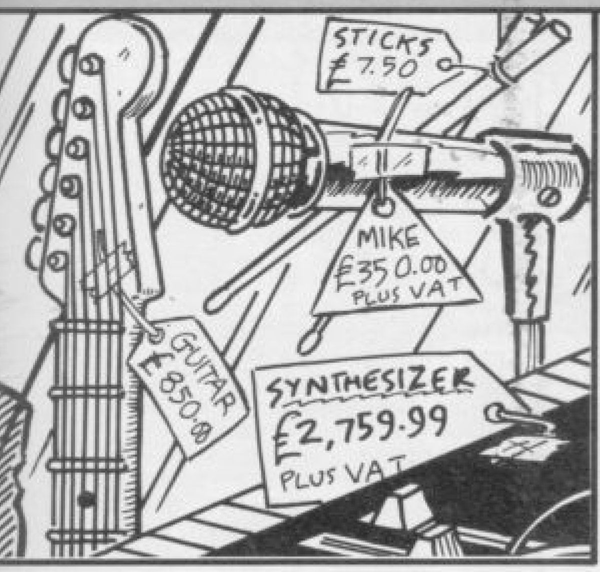
continued on page 130

```
3708 FOR j=1 TO vt
3709 IF v$(i)=v$(d(j)) THEN  GO
TO 3723
3711 NEXT j
3713 LET rr=INT (RND*3)-1
3715 LET r(i)=r(i)+rr
3718 IF r(i)<-2 THEN  LET r(i)=-
2
3720 IF r(i)>15 THEN  LET r(i)=1
5
3723 NEXT i
3725 FOR i=1 TO vt
3727 LET r(d(i))=r(d(i))-2
3731 IF r(d(i))<-2 THEN  LET r(d
(i))=-2
3732 IF r(d(i))>15 THEN  LET r(d
(i))=15
3734 NEXT i
3750 GO SUB 7000: GO SUB 5000: C
LS : GO TO 1450
4010 PRINT AT 0,12;"TOUR NEWS":
PRINT
4020 PRINT TAB 3;"VENUE";TAB 20;
"PERF.(2*sp)AUD.": PRINT
4030 LET X$="vgoodgood toughpoor
 awful"
4040 LET z$="vgoodgood avge poor
 vpoor"
4045 FOR i=1 TO vt
4048 LET ar=INT (RND*5)+1
4050 LET ap=INT (RND*5)+1
4060 LET u$=x$((ar*5-4) TO (ar*5
))
4070 LET w$=z$((ap*5-4) TO (ap*5
))
4080 PRINT v$(d(i));"(sp)";W$;"(
sp)";U$
4090 IF ar=1 THEN  LET a(d(i))=0
: LET r(d(i))=r(d(i))+1
4091 IF ar=2 THEN  LET a(d(i))=0
4096 IF ar=5 THEN  LET a(d(i))=a
(d(i))+1
4098 IF a(d(i))>5 THEN  LET a(d(
i))=5
4100 IF ap=1 THEN  LET r(d(i))=r
(d(i))+3
4102 IF ap=2 THEN  LET r(d(i))=r
(d(i))+2
4103 IF ap=3 THEN  LET r(d(i))=r
(d(i))+1
4107 IF ap=5 THEN  LET r(d(i))=r
(d(i))-1
4108 IF r(d(i))<-2 THEN  LET r(d
(i))=-2
4109 IF r(d(i))>15 THEN  LET r(d
(i))=15
4111 NEXT i
4112 PRINT AT 12,0;"PERF. - Your
 rating of the gig."
4115 PRINT AT 14,0;"AUD.(2*sp)-
The audience's response."
4130 GO SUB 7000: RETURN

4503 BORDER 2: PAPER 2: CLS
4504 PRINT AT 0,12;"VENUE SCAN"
4505 PRINT AT 1,6;"Venue";AT 1,1
8;"Times played"
4508 POKE 23692,255
4510 FOR i=1 TO 180
4515 PRINT v$(i);"(2*sp)";v(i):
PAUSE 35
4518 NEXT i
4525 PRINT "(3*sp)PRESS ANY KEY
TO CONTINUE": PAUSE 0
4530 POKE 23692,1: RETURN
5010 CLS : LET H=INT (RND*18)+1
5020 GO SUB h*100+5000
5040 RETURN
5100 IF NOT aw-we>20 THEN  RETUR
N
5102 GO SUB 7070
5105 PRINT "A single has been ta
ken from"'a$: PRINT
5110 LET sg=INT (RND*15)+1
5115 IF sg<=5 THEN  LET mo=mo-10
00: LET g$="FLOP."
5120 IF sg>=6 AND sg<=10 THEN  L
ET mo=mo+2500: LET SS=ss+.5: LET
 g$="Chart entry."
5125 IF sg>=11 AND sg<=13 THEN
LET mo=mo+2500: LET ss=ss+1: LET
```



```
 g$="Top 20 hit."
5130 IF sg>=14 THEN  LET mo=mo+5
000: LET ss=ss+1.5: LET g$="Top
10 hit."
5140 PRINT "This single is a ";g
$
5145 GO SUB 7000: RETURN
5200 IF NOT (we=26 OR we=78 OR w
e=130 OR we=182) THEN  RETURN
5201 GO SUB 7070
5205 PRINT "You are asked to pla
y READING(3*sp)Do you accept? (Y
/N)": PRINT
5210 GO SUB 100
5215 LET y$=INKEY$
5218 IF Y$<>"Y" AND Y$<>"y" THEN
 RETURN
5220 LET mo=mo+(ss*100): LET GT=
GT+1: LET ss=ss+2: PRINT : PRINT
 "READING BOOKED - INCOME £";INT
 ss*100
5232 GO SUB 7000: RETURN
5300 IF NOT ss>90 THEN  RETURN
5302 GO SUB 7070
5305 PRINT "Your agent has arran
ged for you to headline at WEMBL
Y"
5310 PAUSE 70: PRINT
5315 PRINT "How many nights do y
ou want(5*sp)to book? (0 - 4)":
PRINT
5320 INPUT wb
5325 IF wb<0 OR wb>4 THEN  GO TO
 5320
5328 PRINT "Nights booked = ";wb
5330 IF wb=0 THEN  RETURN
5335 PRINT "INCOME £";INT (wb*ss
*60)
5340 LET mo=mo+(wb*ss*60): LET s
s=ss+2: LET GT=GT+WB
5350 GO SUB 7000: RETURN
5400 GO SUB 5200: RETURN
5500 GO SUB 7070: PRINT "New equ
ipment costs £";INT ss*12: LET m
o=mo-(ss*12)
5505 GO SUB 7000: RETURN
5600 IF NOT gt>100 THEN  RETURN
5602 GO SUB 7070
5603 LET hol=INT (RND*4)+1
5605 PRINT "The band takes a bre
ak"'"of ";hol;" weeks.": LET we=
we+hol
5610 GO SUB 7000: RETURN
5700 IF NOT (we=20 OR we=75 OR w
e=123 OR we=177) THEN  RETURN
5701 GO SUB 7070
5705 PRINT "You are asked to pla
y DONINGTON Do you accept? (Y/N)
": PRINT
5710 GO SUB 100
5715 LET y$=INKEY$
5718 IF y$<>"y" AND y$<>"Y" THEN
 RETURN
5720 LET mo=mo+(ss*125): LET GT=
GT+1: LET ss=ss+2.5: PRINT : PRI
NT "DONINGTON BOOKED - INCOME £"
;INT ss*125
5735 GO SUB 7000: RETURN
5800 GO SUB 5700: RETURN
5900 IF NOT ss>75 THEN  RETURN
5902 GO SUB 7070
5910 PRINT "Lighting expert Dave
 'Hurricane'Cox has designed a n
ew laser(4*sp)extravaganza."',"C
ost £";INT ss*9.9
5915 LET mo=mo-(INT ss*9.9): LET
 ss=ss+2: GO SUB 7000: RETURN
6000 GO SUB 7070: PRINT "Mick 'L
ager-Dash' Cox, one of(3*sp)your
 roadies, has been caught(3*sp)i
n possession of the dreaded(4*sp
)weed.(2*sp)Fine costs £";INT (2
0*ss);".": LET mo=mo-(20*ss)
6005 GO SUB 7000: RETURN
6100 GO SUB 7070: PRINT "Fan-clu
b secretary Debb 'Love(3*sp)Load
ed' Cotterill designs a(5*sp)new
 logo for tour merchandise."
6105 PRINT : PRINT "Additional i
ncome £";INT (ss*25): LET mo=mo+
INT (ss*25)
6150 GO SUB 7000: RETURN
6200 GO SUB 7070: PRINT "Marion
the 'Backstage Queen'(4*sp)devis
es a new stage show for(4*sp)fut
ure gigs"
6203 PRINT : PRINT "Costs £";INT
 (ss*10)+75: LET mo=mo+INT (ss*1
0)+75
6205 GO SUB 7000: RETURN
6300 IF at<=0 THEN  RETURN
6305 GO SUB 7070
6308 LET als=((RND*100)+50)*ss*a
t
6310 PRINT "Receipts from album
sales:-"''"(13*sp)£";INT als
6315 LET ss=ss+.5*at: LET mo=mo+
als
6350 GO SUB 7000: RETURN
6400 IF NOT aw-we>23 THEN  RETUR
N
6401 GO SUB 7070
6402 LET cov=INT (RND*4)+1
6405 PRINT "Printers have diffic
ulty(8*sp)producing your album c
over.(5*sp)Release date set back
 ";cov;" weeks."
6410 PRINT : PRINT "Do you wish
to postpone any tour plans? (Y/N
)"
6415 GO SUB 100
6420 LET y$=INKEY$
6423 IF y$<>"y" AND y$<>"Y" THEN
 RETURN
6425 LET we=we+cov
6430 LET ss=ss-(INT (RND*3)+1)
6440 GO SUB 7000: RETURN
6500 GO SUB 7070
6505 LET err=(RND*16)+5: LET err
=err/10: LET err=INT (err*10+.5)
/10
6510 PRINT "G & HM Taylor, your
financial(3*sp)advisers, tell yo
u of an(8*sp)accounting error of
 ";err;"%"
6512 LET erx=INT (RND*2): IF erx
=1 THEN  GO TO 6530
6515 PRINT : PRINT "DEDUCTION :
```




```
£";INT (MO*err/100)
6520 LET MO=MO-(mo*err/100)
6525 GO SUB 7000: RETURN
6530 PRINT : PRINT "ADDITION : £
";INT (mo*err/100)
6535 LET mo=mo+(mo*err/100)
6540 GO SUB 7000: RETURN
6600 IF NOT (ss>=85 AND we>=182)
 THEN  RETURN
6605 GO SUB 7070
6610 PRINT AT 5,5; FLASH 1;"CONF
IRMATION OF TOURS": PRINT : PRIN
T
6615 PRINT "The deal negotiated
by H.M.G.(3*sp)productions revis
es the 8-gig(3*sp)restriction im
posed by venues onthe British ci
rcuit (81-120)."
6620 PRINT : PRINT " VENUES(3*sp
)CIRCUIT(4*sp)GIG LIMIT(2*sp)"
6630 PRINT "(2*sp)1-80(4*sp)PUBS
 etc(7*sp)5(6*sp)"
6635 PRINT  FLASH 1;" 81-120(3*s
p)BRITISH(7*sp)10 "
6640 PRINT "121-150(3*sp)EUROPEA
N(7*sp)3"
6645 PRINT "151-180(3*sp)USA/JAP
AN(6*sp)3"
6650 LET HH=1
6690 GO SUB 7000: RETURN
6700 GO SUB 6600: RETURN
6800 GO SUB 6600: RETURN
7000 PRINT AT 21,0;"(3*sp)PRESS
ANY KEY TO CONTINUE": PAUSE 10:
PAUSE 0: CLS : RETURN
7070 BORDER 7: PAPER 7: CLS
7071 PRINT AT 0,14;"NEWS": PRINT
 : PRINT : PRINT : PRINT : RETUR
N
7501 BORDER 6: PAPER 6: CLS
7505 LET cg=(ss-stat)+((mo/10000
00)*stat)
7540 PRINT AT 0,11;"SCORE"
7545 PRINT : PRINT b$: PRINT "HA
VE ACHIEVED ";INT (cg*10+0.5)/10
;"% POPULARITY"'"& WEALTH ON THE
 ROAD TO STARDOM"
7547 IF gt=0 THEN  GO TO 7603
7548 PRINT : PRINT : PRINT "PROS
PECTS FOR THE BAND LOOK :-": PRI
NT
7550 LET xxx=((ss-INT stat)/(we-
0.95))*1000
7551 LET xxx=xxx+ss
7552 LET XXX=INT XXX
7560 IF xxx<=250 THEN  PRINT "(5
*sp)"; FLASH 1;"LIKE IT'S TIME T
O QUIT"
7565 IF xxx>=251 AND xxx<=350 TH
EN  PRINT ;"(10*sp)"; FLASH 1;"V
ERY POOR"
7570 IF xxx>=351 AND xxx<=450 TH
EN  PRINT ;"(10*sp)"; FLASH 1;"P
OOR"
7575 IF xxx>=451 AND xxx<=600 TH
EN  PRINT ;"(10*sp)"; FLASH 1;"A
VERAGE"
7580 IF xxx>=601 AND xxx<=700 TH
EN  PRINT ;"(12*sp)"; FLASH 1;"G
OOD"
7585 IF xxx>=701 AND xxx<=850 TH
EN  PRINT ;"(10*sp)"; FLASH 1;"V
ERY GOOD"
7588 IF xxx>=851 AND xxx<=950 TH
EN  PRINT ;"(10*sp)"; FLASH 1;"E
XCELLENT"
7590 IF xxx>=951 THEN  PRINT ;"(
10*sp)"; FLASH 1;"OUTSTANDING"
7592 IF pz=1 THEN  GO SUB 800
7603 PRINT AT 21,0;"(3*sp)PRESS
ANY KEY TO CONTINUE"
7605 PAUSE 10: PAUSE 0: CLS : GO
 TO 1450
8005 DATA "EBONY","NEAT","PEGASU
S","VERTIGO","POLYDOR"
8010 DATA "The Barn","DeneWood",
"Azimuth Studios","Brinney Coppi
ce","Peckingham Hall"
8015 DATA "Bob Amu","Mike Newton
","Tom Biddle","Ian Green","Roge
r Fisher"
8020 DATA 25,40,50,70,99
8025 DATA 10,30,50,65,75
8030 DATA 2,10,5,18,14,30,25,40,
30,50
8035 DATA 5,25,10,45,35,65,55,80
,70,100
8100 DATA "1(2*sp)THE PLOUGH","2
(2*sp)THE HOPWOOD","3(2*sp)THE R
ED LION","4(2*sp)THE RAVEN","5(2
*sp)THE CROWN","6(2*sp)GOLDEN EA
GLE","7(2*sp)THE JUNCTION","8(2*
sp)HOPE & ANCHOR","9(2*sp)THE NA
G'S HEAD","10 DISTRACTIONS","11
THE FILIBUSTER","12 THE BOURNBRO
OK","13 THE GEORDIE","14 THE POW
ERHOUSE","15 THE POWDER KEG","16
 THE COVEN","17 GOLDDIGGERS","18
 J.B.'S","19 THE ROXY","20 'ENRY
'S"
8110 DATA "21 THE 100 CLUB","22
CLOGGS CLUB","23 MOTHER'S","24 S
AXONWOOD","25 MOUNTMORE","26 VAL
HALLA","27 STEPMOTHER'S","28 MER
LIN'S COVE","29 THE MARQUEE","30
 ROCK MACHINE","31 THE HIDEAWAY"
,"32 THE MAYFAIR","33 OAKDEN","3
4 CHESFORD GRANGE","35 KINETIC C
IRCUS","36 YORK ART C'TRE","37 B
'HAM ART C'TRE","38 CHAPLIN'S","
39 MYRIAN","40 STORMWOOD"
8120 DATA "41 ASTON UNIV","42 B'
HAM UNIV","43 KEELE UNIV","44 WA
RWICK UNIV","45 SHENSTONE","46 N
EWMAN ","47 SUMMERFIELD","48 WES
TFIELD","49 WESTHILL","50 TUDOR
GRANGE","51 DUDLEY POLY","52 L.S
.E.","53 U.E.A.","54 YORK UNIV",
"55 BATH UNIV","56 LANCHESTER","
57 MARJOHN","58 HULL UNIV","59 M
ADELEY","60 LOUGHBOROUGH","61 SA
LFORD UNIV","62 BRISTOL UNIV","6
3 B'HAM POLY","64 C.C.A.T.","65
TRENT POLY","66 WORCESTER","67 G
IRTON COLLEGE","68 STIRLING UNIV
","69 DURHAM UNIV","70 PRESTON P
OLY","71 NOTTS UNIV","72 CARDIFF
 UNIV","73 SUSSEX UNIV","74 READ
ING UNIV","75 HATFIELD POLY","76
 PLYMOUTH POLY"
8130 DATA "77 BEDFORD COLLEGE","
78 BRUNEL UNIV","79 N.STAFFS POL
Y","80 RUGBY C OF E"
8140 DATA "81  AYLESBURY FRIAR",
"82  B'HAM ODEON","83  BRIGHTON
PAV","84  IPSWICH GAUMONT","85
BRISTOL COLSTON","86  CARDIFF OD
EON","87  COVENTRY TH'TRE","88
DERBY ASSM RMS","89  EDIN USHER
HALL","90  GLASGOW APOLLO","91
EXETER CITY H","92  LEICS DE M H
ALL","93  L'POOL EMPIRE","94  TH
E ROUNDHOUSE","95  H'SMITH ODEON
","96  LONDON LYCEUM","97  LONDO
N DOMINION","98  QUEENS U B'FAST
","99  MALVERN W GDNS"
8150 DATA "100 MAN APOLLO","101
NEWCASTLE C H","102 NEW BINGLEY
H","103 WOLV CIVIC HALL","104 LE
EDS TOWN HALL","105 LOWESTOFT PA
V","106 OXFORD APOLLO","107 DIGB
ETH CIVIC H","108 CAM CORN EXCH"
,"109 N.E.C.","110 EDIN PLAYHOUS
E","111 DUNDEE CAIRD H","112 KIN
GS X CINEMA","113 HULL TOWN HALL
","114 SHEFFIELD C H","115 AYR C
ALEDONIAN","116 LEWISHAM ODEON",
"117 YORK MINSTER","118 MIDNIGHT
 COURT","119 FAIRFIELD HALL","12
0 CREWE PAVILLION"
8160 DATA "121 PARIS","122 ZURIC
H","123 HAMBURG","124 NANCY","12
5 PORI","126 OSLO","127 STOCKHOL
M","128 COPENHAGEN","129 BERLIN"
,"130 AMSTERDAM","131 BRUSSELS",
"132 OSTEND","133 ROTTERDAM","13
4 ANTWERP","135 LYON","136 WARSA
W","137 KOLN","138 BREMEN","139
LUXEMBURG","140 WILLISAU","141 L
UCERNE","142 MILAN","143 HELSINK
I","144 BUDAPEST","145 MUNICH","
146 STUTTGART","147 NANTES","148
 ROME","149 MADRID","150 MALMO"
8170 DATA "151 SAN FRANCISCO","1
52 BUFFALO","153 PHEONIX","154 B
OSTON","155 MINNEAPOLIS","156 PO
RTLAND","157 CINNCINATI","158 SA
LEM","159 TORONTO","160 LOS ANGE
LES","161 NEW ORLEANS","162 OMAH
A","163 DALLAS","164 SACRAMENTO"
,"165 TULSA","166 SAN DIEGO","16
7 SEATTLE","168 SALT LAKE CITY",
"169 NEW YORK","170 BALTIMORE","
171 DETROIT","172 PHILADELPHIA",
"173 ALBANY","174 MEMPHIS","175
ATLANTA","176 OSAKA","177 NAGOYA
","178 TOKYO","179 YOKOHAMA","18
0 NAGASAKI"
8200 DATA 0,7,0,2,3,5,3,8,7,1,1,
3,4,3,6,6,6,5,5,5,6,2,10,8,8,7,8
,6,10,7,6,10,3,1,8,3,6,0,2,7
8210 DATA 7,10,8,8,4,2,7,7,1,0,2
,8,6,7,8,5,1,6,2,3,5,10,9,8,4,0,
4,5,5,2,1,5,6,9,9,0,2,0,2,2
8220 DATA 9,8,6,2,6,3,5,2,7,7,2,
6,6,7,10,8,7,7,1,7,6,8,2,5,7,6,5
,8,10,2,2,10,0,1,2,0,10,10,1,0
8230 DATA 8,10,1,2,3,8,9,2,7,10,
8,2,9,2,4,5,0,6,7,1,7,10,1,7,8,6
,0,6,2,7
8240 DATA 10,8,1,0,2,7,1,5,8,10,
7,8,7,1,5,0,10,2,9,0,6,7,8,9,2,6
,1,4,3,7
8300 DATA 15,35,16,44,56,41,56,4
5,50,30,17,51,75,63,49,63,64,24,
70,13,92,14,46,60,33,25,40,21,75
,75,30,85,63,66,42,80,33,75,65,4
5
8310 DATA 70,95,45,60,30,75,20,4
2,78,80,90,50,75,57,42,80,60,85,
87,75,58,80,40,55,42,42,72,60,62
,70,95,45,90,50,60,45,72,40,82,9
0
8320 DATA 140,750,400,600,600,65
0,250,500,800,750,510,610,750,20
0,950,240,200,800,420,800,410,97
5,180,400,130,145,200,210,2000,6
00,1250,150,150,140,750,700,190,
350,600,250
8330 DATA 2750,2950,1800,1750,17
00,300,450,2800,475,2000,520,175
0,580,1600,375,1750,250,400,1700
,300,525,350,325,1725,1750,600,2
50,1600,1550,585
8340 DATA 5000,1000,4500,4000,52
5,700,3750,3800,4000,5750,780,12
00,3900,4200,675,4000,590,4000,4
200,570,1000,1230,1200,1000,3850
,6000,650,625,590,4590
8999 STOP
9880 SAVE "road" LINE 5
9881 VERIFY "road"
9882 STOP
9890 CLS : LET memory=(PEEK 2373
0+256*PEEK 23731-PEEK 23653-256*
PEEK 23654)
9891 PRINT AT 8,3;"MEMORY USED:"
;(((48*1024)-memory)/1024)
9892 PRINT AT 10,3;"MEMORY FREE:
";memory/1024
9899 STOP
```

THE SWEET GAME

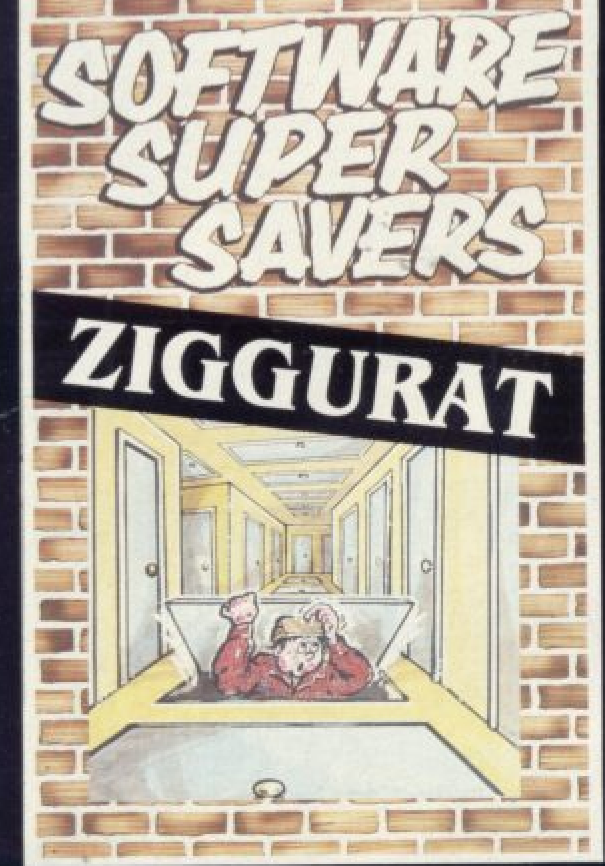


YOU SHOULD never have busted that fence. The park keeper is hopping mad, and the only way to placate him is to collect up the sweets in the park. Unfortunately you must do it in a given length of time or the park keeper will incinerate you with his regulation Parks and Recreation Dept laser gun.

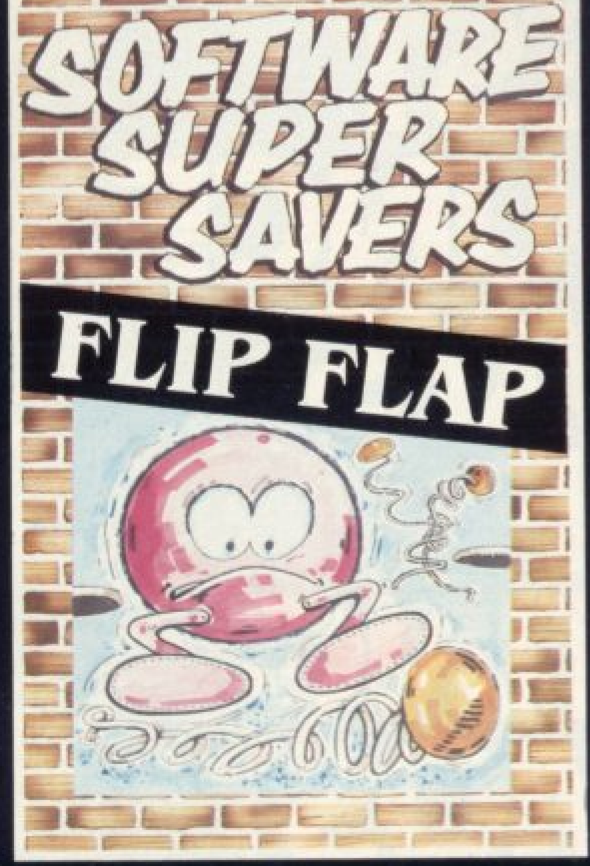
The Sweet Game was written by Benjamin Regis of London and runs on the 16K Spectrum.

The program uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the program.

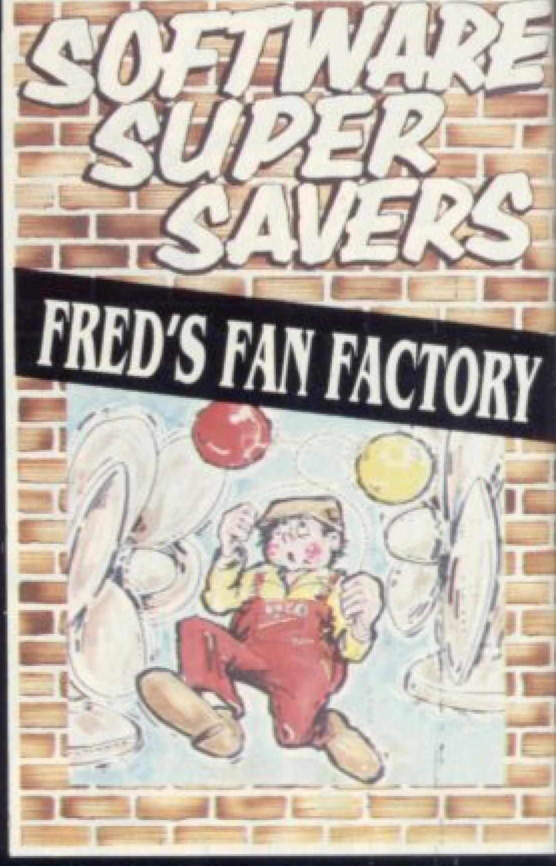
```
  80 PAPER 7: BORDER 7: INK 0: C
LS
  90 GO SUB 9000
 100 REM *** Instructions ***
 110 PRINT AT 0,10;"Sweet Game"
 120 PRINT AT 0,10; OVER 1; INK
2;"__________"
 130 PRINT ''"(2*sp)The aim of t
he Sweet Game is(2*sp)to collect
 20 sweets("; INK 2;"B"; INK 0;"
) for the park keeper to repay h
im for thefence that you broke.O
ne problemis that the park keepe
r is(6*sp)giving you a limited t
ime to(4*sp)collect them.Another
 problem is that when you pick u
p a sweet(3*sp)you leave a stick
y mess behind(2*sp)(C). If you s
hould get stuck in it then a few
 seconds of your(3*sp)time is ta
ken to get out of it."
 140 PRINT  INK 2;"(2*sp)If you
should fail to collect all 20 sw
eets the park keeper(3*sp)will s
hoot you with his laser."; INK 1
;''"Keys - Cursor Keys (5,6,7&8)
"
 150 PRINT ' INK 3;"GOOD LUCK!"
 160 PRINT #1;AT 1,0;"Press any
key to continue": PAUSE 0: CLS
 170 GO SUB 8000
 180 GO SUB 7000
 190 REM *** Main Loop ***
 200 IF INKEY$="5" AND b>1 THEN
 PRINT AT a,b;"(sp)": LET b=b-1
 210 IF INKEY$="6" AND a<20 THEN
  PRINT AT a,b;"(sp)": LET a=a+1
 220 IF INKEY$="7" AND a>2 THEN
 PRINT AT a,b;"(sp)": LET a=a-1
 230 IF INKEY$="8" AND b<30 THEN
  PRINT AT a,b;"(sp)": LET b=b+1
 240 PRINT AT a,b; INK 1;"D"
 250 IF a$(a,b)="C" THEN  GO SUB
 6000
 260 IF a$(a,b)="B" THEN  GO SUB
 5000: GO SUB 8040
 270 PRINT AT 0,0;"Score(sp)";sc
ore
 280 IF score=20 THEN  GO SUB 30
00
 290 LET time=time-1 AND time<>0
: PRINT AT 0,17;"Time(sp)";time;
"(2*sp)"
 300 IF time=0 THEN  GO TO 4000
 310 GO TO 200
3000 REM *** End of Sheet ***
3010 FOR r=1 TO 2: FOR s=-20 TO
40: BEEP .01,s: NEXT s
3020 FOR s=40 TO -20 STEP -1: BE
EP .01,s: NEXT s: NEXT r
3030 FOR s=1 TO 100: NEXT s: CLS
3040 PRINT AT 2,10; INK 2;"WELL
DONE!"
3050 BEEP .1,10
3060 PRINT  INK 3''"(sp)You have
 successfully managed(3*sp)to co
llect 20 sweets for the(12*sp)pa
rk keeper"
3070 FOR s=1 TO 300: NEXT s
3080 IF t<=u+50 THEN  GO TO 3500
3090 PRINT  INK 1;''"(5*sp)The p
ark keeper is not(6*sp)satisfied
 and you are going to(4*sp)have
to collect another 20(5*sp)sweet
s for him.This time you(10*sp)ha
ve less time."
3100 BEEP .5,-20
3110 LET t=t-50: LET time=t
3120 LET score=0
3130 PRINT #1;AT 1,0;"Press any
key to continue": PAUSE 0: CLS :
 GO SUB 8000: RETURN
3500 REM *** Win Routine ***
3510 FOR s=1 TO 200: NEXT s: FOR
 s=1 TO 20: PAPER INT (RND*8): C
LS : BORDER INT (RND*8): BEEP .0
1,INT (RND*100)-40: NEXT s: PAPE
R 7: BORDER 7: CLS
3520 PRINT  INK 2;AT 5,0;"(sp)TH
E PARK KEEPER IS SATISFIED"; INK
 1''"(6*sp)YOU ARE FREE TO GO"
3530 INPUT "Another go ? (y/n)(s
p)";b$
3540 IF b$="Y" OR b$="y" THEN  R
UN
3550 STOP
4000 REM *** Laser Routine ***
4010 FOR l=20 TO a+1 STEP -1: PR
INT AT l,b; INK RND*7;"!": BEEP
.02,60: NEXT l
4020 FOR m=1 TO 5: FOR l=6 TO 0
STEP -1: PRINT AT a,b; INK l;"D"
: PRINT AT 3,9; INK l;"YOU ARE D
EAD": BEEP .1,(l*10)-20: NEXT l:
 NEXT m
4030 INPUT "Another go ? (y/n)(s
p)";b$
4040 IF b$="Y" OR b$="y" THEN  R
UN
4050 STOP
5000 REM *** Collect Sweet ***
5010 LET score=score+1
5020 LET a$(a+1,b)="C": PRINT AT
 a+1,b;"C"
5030 LET a$(a,b)="(sp)"
5040 BEEP .1,10
5050 RETURN
6000 REM *** Sticky mess ***
6010 BEEP .5,-20: FOR c=1 TO 20:
 LET time=time-1: PRINT AT 0,17;
"Time(sp)";time;"(2*sp)": NEXT c
6020 LET a$(a,b)="(sp)"
6030 RETURN
7000 REM *** Variables ***
7010 LET a=11: LET b=15
7020 LET score=0
7030 INPUT "Skill level ? (1-10,
1-hard)";u: IF u>10 OR u<1 THEN
 GO TO 7030
7040 LET u=(u*50)+200
7050 LET time=u+150: LET t=time
7060 RETURN
8000 REM *** Set-up screen ***
8010 DIM a$(22,32)
8020 FOR x=0 TO 31: PRINT  INK 1
;AT 1,x;"A";AT 21,x;"A": NEXT x
8030 FOR x=1 TO 21: PRINT  INK 1
;AT x,0;"A";AT x,31;"A": NEXT x
8040 LET p=INT (RND*19)+2: LET q
=INT (RND*30)+1
8050 LET a$(p,q)="B": PRINT AT p
,q; INK 2;"B"
8060 INK 0
8070 RETURN
9000 REM *** Graphics ***
9010 FOR y=USR "a" TO USR "d"+7
9020 READ z: POKE y,z: NEXT y
9030 DATA 36,36,255,36,36,255,36
,36
9040 DATA 24,60,126,255,255,126,
60,24
9050 DATA 170,85,170,85,170,85,1
70,85
9060 DATA 56,56,16,255,56,56,68,
130
9070 RETURN
```



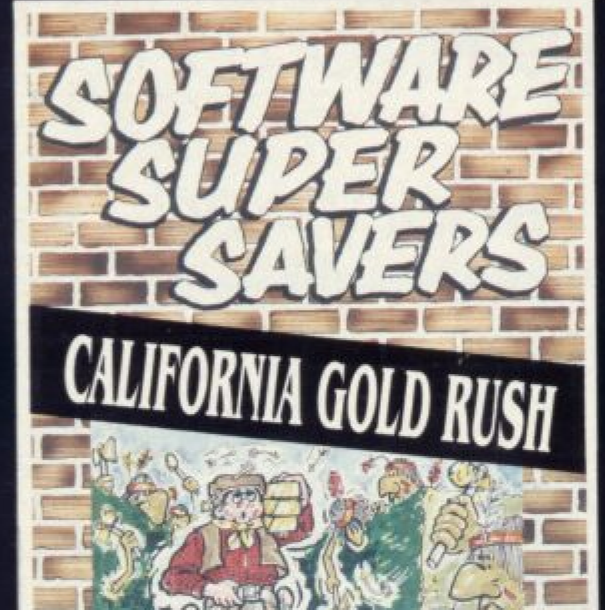
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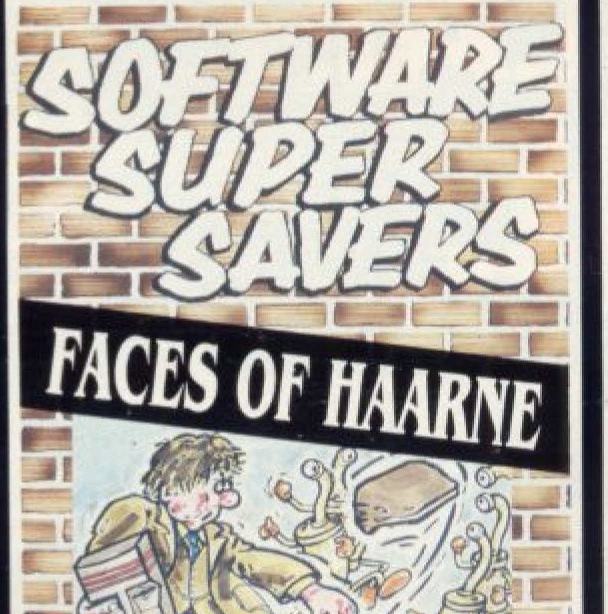
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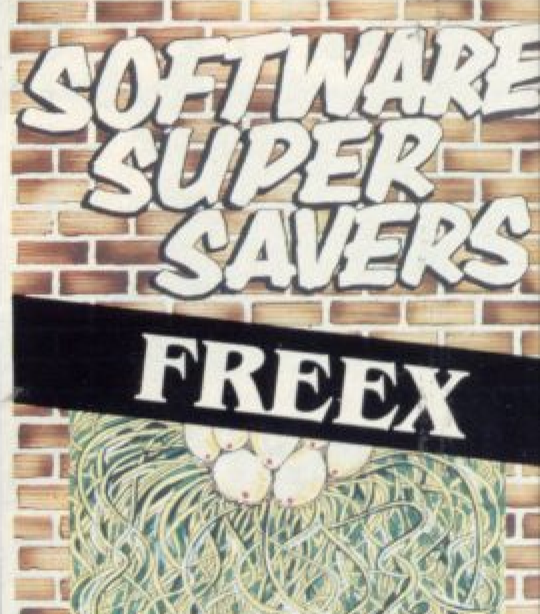
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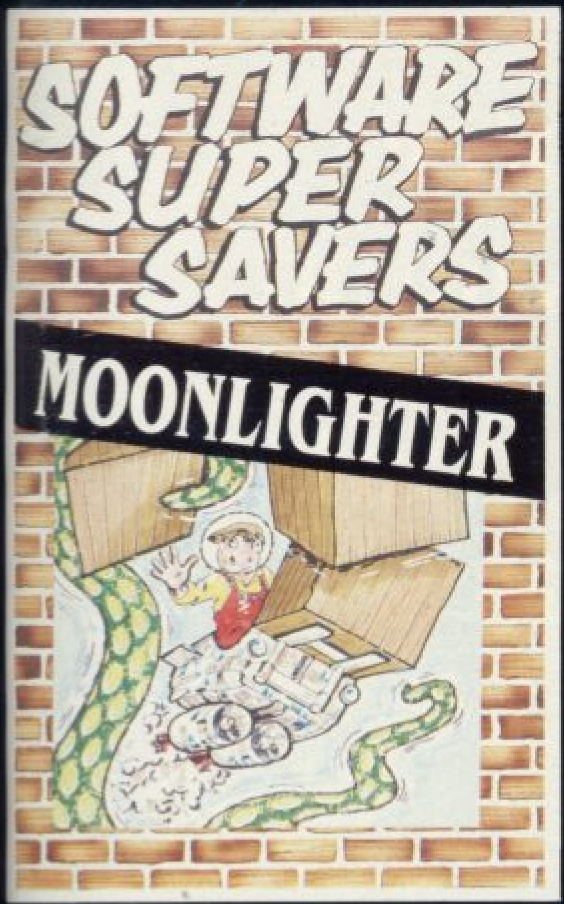
In the heart of hostile Indian Country, prospector Jake has discovered a fabulous fortune in gold, spread out in 24 rich fields. To claim these riches he has to fence off each mine. The Indians, alas, have other ideas, tearing down his fences and attacking him with arrows and tomahawks. Can Jake block the Indians with carefully placed sticks of dynamite and stake his claim to the fortune.
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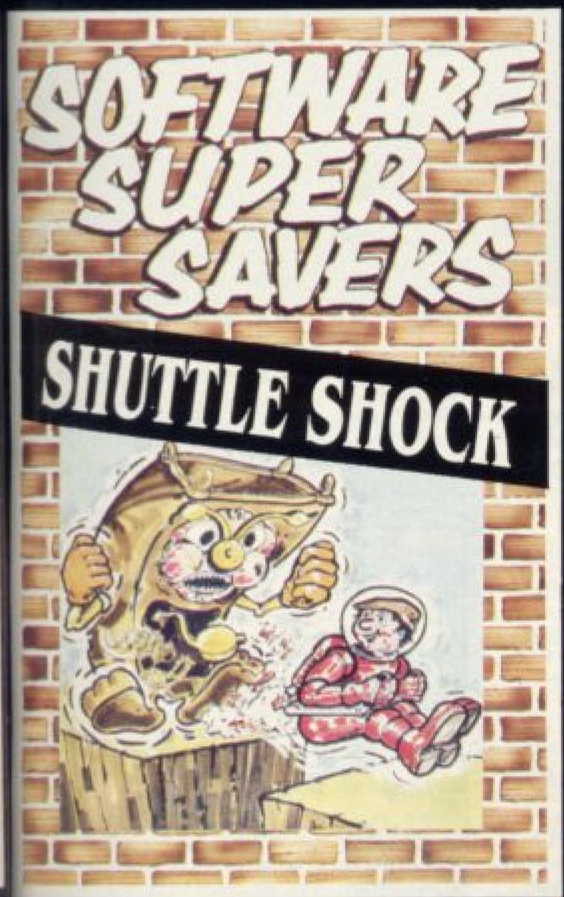
Night falls over the city and at the local museum Herbert the curator is doing his rounds. As he approaches the Green Room containing the mysterious and fabulously valuable "Faces of Haarne", strange noises can be heard from within. Armed with his steel-rimmed "Odd-Job" hat, Herbert enters the room. You won't believe what he encounters!
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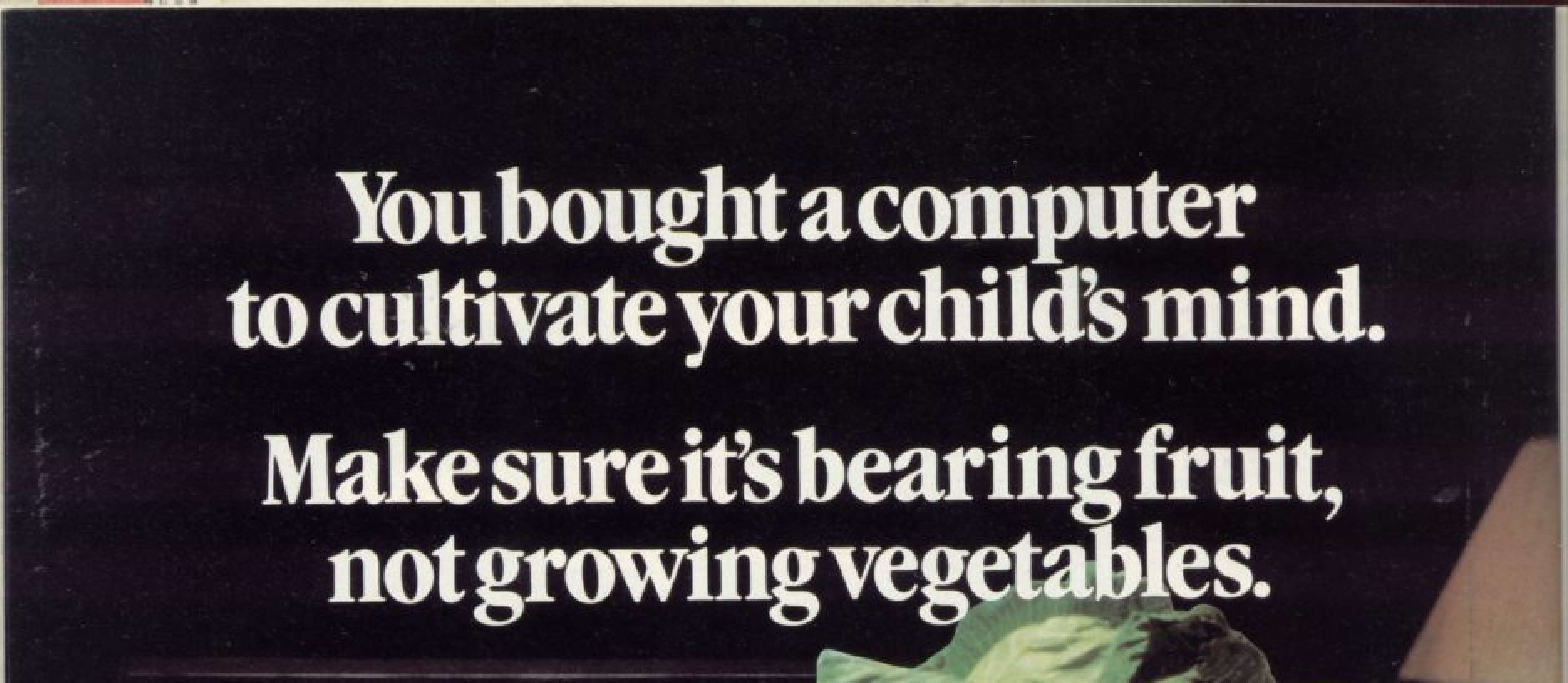
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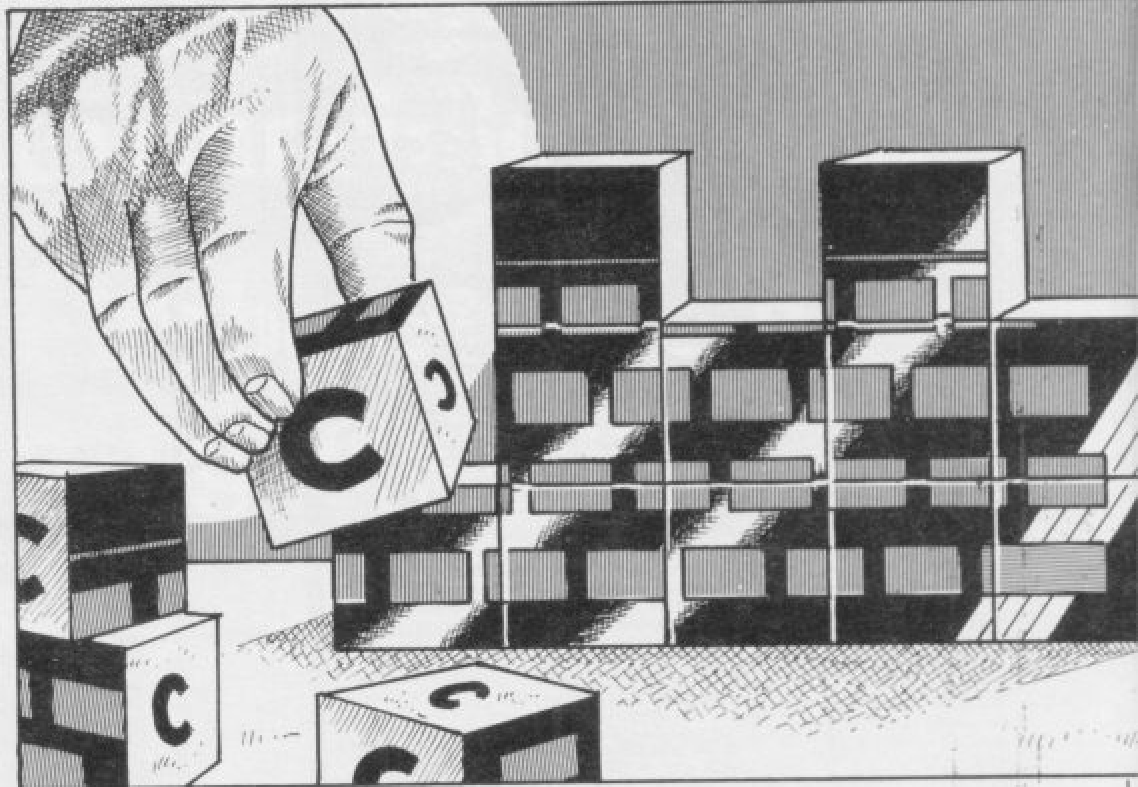


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A language for the future

Adam Denning lays bare the mysteries of C, a new language for the Spectrum which is faster than Forth and simpler than Pascal.

IF THE SPECTRUM was pitched against the BBC Micro for serious applications, it would not be at all surprising if it came out on top amongst programmers. That is almost entirely due to the efforts of one small software company up in Bedfordshire, Hisoft.

The company's release of its acclaimed Pascal compiler over a year ago, coupled with the simultaneous release of its machine code development system Devpac, has gained it and the Spectrum a higher credibility factor than Sinclair Research could ever manage by itself.

Now the company has released another compiler, this time for the language **C.** C is widely regarded as the language of the future, not least because of its unique position as the language in which Unix™ is written. Unix is now the de facto standard operating system for any 16-bit computer, with versions even available for the 68000 extended BBC Micro and soon the QL.

C is integral to all that, gaining a reputation as the systems language most likely to succeed. It has two main advantages over other languages like Basic and Pascal: First, C is standard, so programs are in practice portable — as opposed to the theoretical portability of Pascal and the mess created by the myriad versions of Basic. Second, it is block structured and far less formal than rivals of the Pascal ilk.

Two long words here, both of which need definition. A portable language is one which has exactly the same form on all machines, which means a program written in language X on machine Y will run without alteration on another machine Z that also supports language X. Only C gets truly close to that level of portability.

A block structured language is one in which each task in a program is broken down into small, easily manageable modules. That type of programming is much in vogue, with Pascal being the most shouted-about progenitor. The trend probably started with the BCPL language, developed by Dr Martin Richards in Cambridge, but Pascal and C soon became more widely used.

BCPL is in fact the grandfather of C, as two Americans, Dennis Ritchie and Brian Kernighan, took the offspring of BCPL — called B — and came up with C. The only book worth reading on C was written by those two Americans, and is called *The C Programming Language* published by Prentiss Hall and costing £16.95.

So the Spectrum now provides more opportunity for the budding systems programmer than any other home micro widely available. The provision of C gives distinct advantages to the Spectrum owner, as it is compiled into Z80 machine code and therefore runs faster than most other languages available — it beats the hell out of Forth.

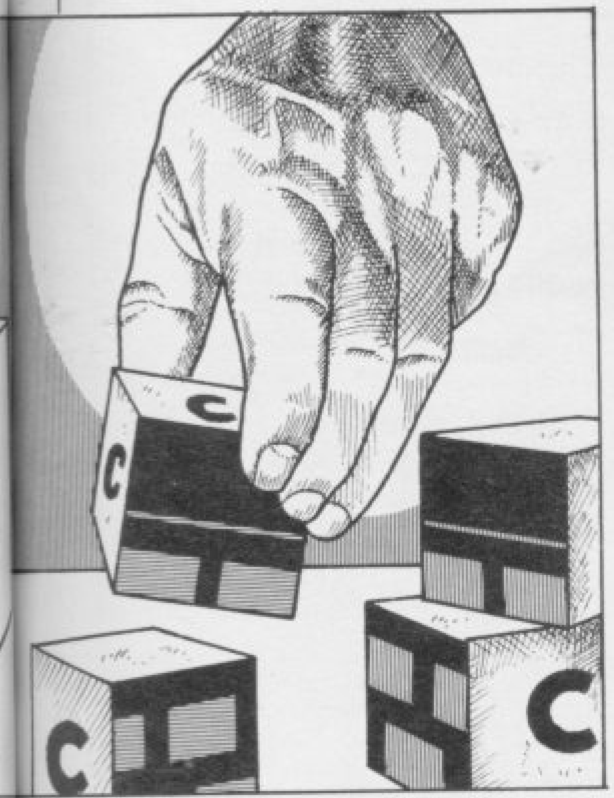
Moreover, anyone contemplating a career in computing is going to need to know about the language, and this is the cheapest option there is. The average programmer will also find it useful as it is easier to use than Pascal and easier to learn. It can do almost everything which Spectrum Basic can do without any of the disadvantages.

Hisoft C is supplied on a cassette, containing everything — the compiler, the editor, the standard input/output header and a library of useful system routines. Once loaded the program asks if you wish to save the compiler and editor to microdrive. That follows Hisoft philosophy of making all its products microdrive compatible, so that a user equipped with those devices need never be hampered by having to return to cassette tapes again.

The editor supplied as an integral part of the compiler is the standard Hisoft line editor used on all its source code based products, but programs can be written without recourse to the editor once you are familiar with both C and the implementation. The editor is invoked by pressing CAPS SHIFT and 1, i.e. EDIT, simultaneously, and from thereon all functions are standard until the c commnd is used to return to the C compiler.

C programs created that way can be saved to and loaded from tape or microdrive, and of course any section of saved source can be included in a compilation with the **#include** directive. That is standard practice in C compilers as it is usual for at least one header file containing all the #define definitions and standard i/o to be included in the source file.

Hisoft C has something else which, as far as we know, is unique — programs can be entered directly into the compiler just by typing them in, and subsequently invoked either by telling the machine that the end of the source file has been reached — by pressing SYMBOL SHIFT i — or by going into **direct** mode with #direct+ and typing



a suitable invocation such as:

main();

That direct mode also means that individual functions can be tested as stand alone programs, or quick calculations can be done. For instance, you might want to know the hexadecimal equivalent of 23456. All you have to do (assuming you are in direct mode) is type:

printf("%x/n", 23456);

and your answer will be printed out. You can leave direct mode by typing #direct-.

Before we look at some C programs and discuss how to use the language, we must look at some of the imperfections of the current version of Hisoft C. The most noticeable of those is that invocation of a non-existent function resets the machine, losing the compiler and returning to Basic.

The **float** type is also missing, which means that floating point numbers cannot be operated on. Oddly, the **scanf** function — the C equivalent of INPUT — is not here either, but it is fairly simple to write the parts of the function that you require.

Those are really the shortcomings worth mentioning, and even those will not be there for long. Hisoft will give a free update to purchasers of the current version of the compiler, and all the facilities mentioned as lacking are going to be included at some stage.

A program consists of a number of functions, of which one must be called **main.** That is where execution begins when the program is run. Of course, Hisoft's direct mode obviates the need for that, but it is best to follow the standard language definition so that later program development on other machines will not be hindered by silly mistakes.

The program in Figure 1 converts any number between 0 and 65535 into its hexadecimal and binary equivalents — a bit simple, perhaps, but then how many of us have programmed in C on the Spectrum before?

The program is simpler than it looks, but introduces a lot of C's more interesting properties. It was very hurriedly written, so it is by no means the best example of C programming.

The first thing we do in all three functions is to declare our variables, so that **main** has two integer variables and a character string (an array) 16 characters long, **readn** has three integers and a smaller string array and **binary** has two integers.

The only function that returns a result is **readn,** and the type of that result is indicated by declaring the function itself as having a type — integer in this case.

We also see that **binary** has two parameters passed to it. We have to tell it what type those parameters are, which is the purpose of the two lines after the function declaration.

The body of the program is controlled by **main.** It first prints a prompt and then uses our **readn** function to read in a decimal number, passing the integer value to the variable **n.** The **binary** function is then called to convert this into a 16 character binary string in the array **b,** and then the answers are printed out. The **printf** function can handle the printing of numbers in hex, but not binary, so we then use a for loop to print out the 16 digits of b in reverse order.

Notice the structure of the 'for loop' — the start value first, then the end condition and finally the increment. The ++ here is just the C way of incrementing.

As carriage returns and various other 'non-printing' characters are rather hard to represent on screen, C uses the backlash (\) as an escape character, so that various symbols after the slash are converted to various characters. Thus, \n is a new line character.

The **readn** function is a very simple method of reading in a number from the keyboard, and has two distinct disadvantages. It can only handle digits, so no sign must be included, and if you type in more digits than there are places in the s array, you will crash the computer. It is, however, quite fast. It simply reads in each digit from the keyboard at a time, using the **getchar** function until it finds a new line character. The != symbol means 'not equal to'.

```
main() /* convert unsigned decimal
  to hex and binary */
{
  int n;
  char b[16];
  printf("Give me a number: ");
  n=readn();
  binary(n,b);
  printf("/nThis is %x in hex and/n",n);
  for (i=0;i=<16; ++i)
       putchar(b[15-i]);
  printf("in binary/n");
}
int readn()
{
  char s[5];
  int i,c,total;
  i=0;
  while ((c=getchar()) !='/n')
    s[i++]=c;
  total=0;
  for (c=0; c<i; ++c)
    total=total*10+s[c]-'0';
  return total;
}
binary(num,digits)
int num;
char digits[];
{
  int i,c;
  for (i=15; i>-1; --i)
     {
       c=num & 1<<i;
       if (c==0)
         digits[i]='0';
       else
         digits[i]='1';
     }
}
```

Figure 1

The resulting string is then converted to decimal by taking each digit and progressively adding into ten times the total — a very standard method. That is then returned as the result.

A 'for loop' is also used by binary, this time decrementing from 15 to 0 to access each element of the array in reverse order. We use bitwise ANDing (the **&** operator) on powers of two to generate each binary digit. Each power of two is formed by shifting one left the requisite number of places (the << operator — pure BCPL).

That is by no means the extent of C's usefulness, and its reputation for systems programming is well founded but difficult to demonstrate briefly. It is the most welcome addition to the Spectrum catalogue since Sinclair introduced the Microdrives, and at the price cannot be missed. Hisoft is at: 180 High Street North, Dunstable, Bedfordshire. Tel. 0582 696421.

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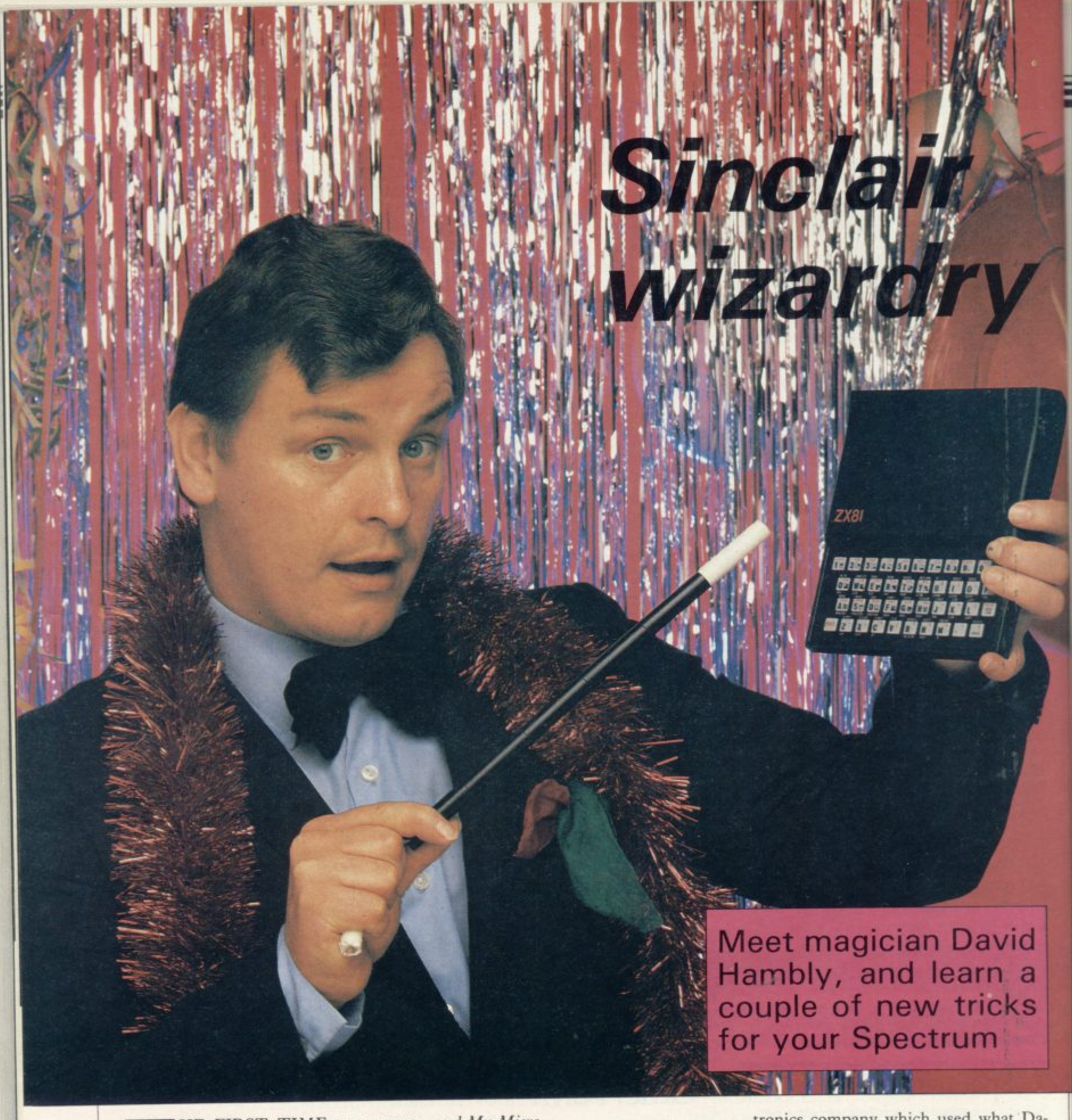
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Sinclair wizardry

Meet magician David Hambly, and learn a couple of new tricks for your Spectrum

THE FIRST TIME you saw a home computer put through its paces you may have felt there was something magical about the machine. David Hambly goes a step further than that. He performs a magic act using the Spectrum.

David's career in magic began over twenty years ago, when he was ten years old, and took up conjuring as a hobby. Since then he has become a member of the International Brotherhood of Magicians, and has performed throughout Europe as a cabaret artist and close-up magician. Recently he has appeared on television in *Video and Chips* and *Me and My Micro.*

One of the more unusual bookings he had was to perform an illusion act from a boxing ring, to warm up the audience before a full-contact karate competition.

Close-up magic is that branch dealing with the manipulation of small objects such as cards or coins, requiring great skill and sleight of hand to accomplish. He says manipulation is going out of fashion among young magicians, who prefer to concentrate on the spectacular self-working tricks involving mechanical apparatus.

David first became familiar with computers while working for an electronics company which used what David describes as a temperamental Digital PDP/8. Although he wanted to buy a Commodore Pet, it was not until Sinclair released the ZX-81 that David was able to afford his own machine. His initial use for the machine was to handle accounts and other aspects of his magic career.

Give a magician any sort of object, and sooner or later he will start to develop a magic trick using it. The ZX-81 was no exception. Before long David was incorporating effects using the computer into his acts. As his skill at programming grew, so did the complexity

of the magic he was able to perform, although David is the first to admit that he is no machine-code wizard. "I'm sure there are better ways of writing the program," he says. "I'm just satisfied if it works."

His most complicated program, which he has surrounded with safeguards against copying, actually devises its own tricks, some of which have been published in specialist magic magazines. David felt the next step was to collect all the notes he had made and write a book, the first ever on the subject, entitled *Computer Magic.*

David says he regrets now some of the secrets he revealed in the book. "There are two techniques in particular I wish I hadn't put in," he says. "They're far too good to use in a book."

If you want to learn those secrets you will have to buy David's book, but in the meantime, here are two of David's programs especially for Sinclair User readers.

Please read the instructions on the first page of Program Printout before typing in the listings.

Find the Rabbit, for the 16K Spectrum, is based on the very well known effect called Three Card Monte, also known as Find the Lady.

Load the program and three cards will be displayed on the screen, face up, two showing a top hat, while the third shows a rabbit, After a key is pressed, the cards are seen face down. Your audience must now guess where the rabbit is.

As an additional trick stick a piece of blank paper onto an old playing card. Draw a rabbit on it and place it in your pocket. At any time during your performance, press key 4. That, as before, will display three cards, face down. Have one of the cards chosen by a friend, and stand by for the Big Surprise.

Displayed will be three cards face up, but now showing three top hats and not two. Explain that the rabbit has nearly vanished and then produce the card from your pocket, to reveal the rabbit.

In Telepathic Computer the computer is able to identify a card which has been selected from a shuffled deck.

First of all, remove all of the following cards from the deck: A-2-3-4-5-6-7 of Spades; 8-9-10-J-Q-K of Hearts; A-2-3-4-5-6 of Clubs; and 7-8-9-10-J-Q-K of Diamonds. Shuffle those 26 cards together, so that they are well mixed.

With the remainder of the pack, consisting of 26 cards and two Jokers, remove the Jokers and place them on

continued on page 148

Find the rabbit

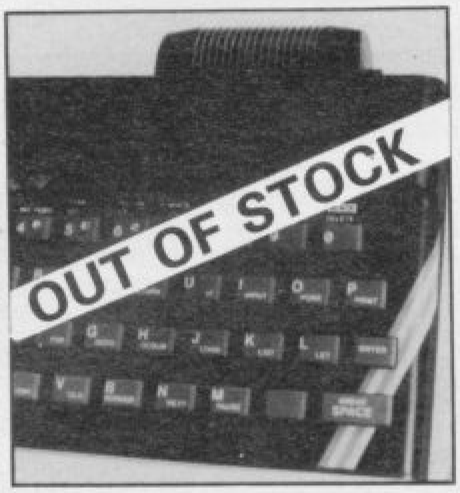
```
   1 BORDER 3: PAPER 7: INK 0: C
LS
   5 PRINT  INK 1;AT 10,8;"THREE
 CARD MONTE."; INK 3;AT 12,8;"(F
IND THE RABBIT)"; INK 0;AT 21,0;
 Sheer Magic Software. 1984."
  10 PAUSE 400
  15 CLS
  16 PRINT TAB 14; PAPER 7; BRIG
HT 1; INK 2; FLASH 1;"NOTE"
  20 PRINT : PRINT : PRINT  PAPE
R 1; INK 7;"The(2*sp)following(2
*sp)program(2*sp)has(4*sp)been d
esigned(2*sp)for entertainmentpu
rposes only."
  25 GO SUB 500: GO SUB 1000
  30 PAUSE 300: CLS
  35 GO SUB 2000
  40 LET a=INT ((RND*3)+1)
  50 BORDER 6
  60 LET j=4
  70 FOR i=6 TO 14
  80 PRINT  PAPER 7; INK 2;AT i,
j;"(5*A,5*sp,5*A,5*sp,5*A)"
  90 NEXT i
 100 PRINT  INK 1; FLASH 1;AT 15
,6;"1";AT 15,16;"2";AT 15,26;"3"
 115 PRINT  INK 3;AT 17,0;"FIND
THE RABBIT.";, INK 1;"CHOOSE A C
ARD. 1 2 OR 3"
 120 PAUSE 0
 125 LET A$=INKEY$
 140 IF A$="1" AND 1=A THEN  GO
TO 200
 143 IF A$="2" AND 2=A THEN  GO
TO 200
 145 IF A$="3" AND 3=A THEN  GO
TO 200
 148 IF A$="4" THEN  GO TO 3000
 150 GO SUB 3000
 155 POKE 23609,255
 160 FOR i=1 TO 20
 165 BEEP .01,-10+i
 170 NEXT i
 180 GO TO 30
 200 PRINT  INK 4; FLASH 1;"YES-
YOU WIN."; FLASH 0; INK 0;"HAVE
ANOTHER GO."
 250 LET D=4: LET E=14: LET F=24
 255 FOR I=6 TO 14
 260 IF A$="1" THEN  GO TO 300
 270 IF A$="2" THEN  GO TO 350
 280 IF A$="3" THEN  GO TO 400
 300 PRINT  PAPER 5;AT I,D;"
 "
 302 PRINT  INK 0;AT 8,5;"KLM";A
T 9,5;"NOP";AT 10,5;"QRS";AT 11,
5;"(sp)T(sp)";AT 13,4; INK 2; IN
VERSE 1;"BUNNY": INVERSE 0
 305 NEXT I
 310 FOR i=1 TO 20
 320 BEEP .015,RND*40
 330 NEXT i
 340 PAUSE 100: GO TO 30
 350 PRINT  PAPER 5;AT I,E;"(5*s
p)"
 353 PRINT  INK 0;AT 8,15;"KLM";
AT 9,15;"NOP";AT 10,15;"QRS";AT
11,15;"(sp)T(sp)";AT 13,14; INK
2; INVERSE 1;"BUNNY": INVERSE 0
 355 NEXT I
 360 FOR i=1 TO 20
 370 BEEP .015,RND*40
 380 NEXT i
 390 PAUSE 100: GO TO 30
 400 PRINT  PAPER 5;AT I,F;"(5*s
p)"
 403 PRINT  INK 0;AT 8,25;"KLM";
AT 9,25;"NOP";AT 10,25;"QRS";AT
11,25;" T ";AT 13,24; INK 2; INV
ERSE 1;"BUNNY": INVERSE 0
 405 NEXT I
 410 FOR i=1 TO 20
 420 BEEP .015,RND*40
 430 NEXT i
 440 PAUSE 100: GO TO 30
 500 FOR a=USR "a" TO USR "a"+7
 510 READ user: POKE a,user
 520 NEXT a: RETURN
 550 DATA 204,204,51,51,204,204,
51,51
1000 RESTORE 1100: FOR a=USR "B"
 TO USR "T"+7
1010 READ user: POKE a,user
1020 NEXT a: RETURN
1100 DATA 0,15,48,71,207,96,31,7
1110 DATA 0,255,0,255,255,0,255,
255
1120 DATA 0,240,48,198,195,2,255
,252
1130 DATA 4,5,5,5,5,5,5,5
1140 DATA 0,249,249,249,249,249,
249,249
1150 DATA 16,240,240,240,240,240
,240,240
1160 DATA 5,5,5,5,5,3,1,0
1170 DATA 249,249,249,249,249,23
3,255,0
1180 DATA 240,240,240,240,240,22
4,192,0
1200 DATA 4,12,18,18,18,17,17,17
1210 DATA 0,1,1,1,2,2,2,4
1220 DATA 172,32,32,96,160,160,1
60,32
1230 DATA 17,9,8,4,4,5,5,11
1240 DATA 5,249,0,0,198,41,41,23
9
1250 DATA 64,64,128,128,128,0,64
,64
1260 DATA 16,16,34,35,34,8,4,3
1270 DATA 48,48,73,255,121,48,0,
128
1280 DATA 64,64,64,32,32,32,64,1
28
1290 DATA 65,62,0,0,0,0,0,0
2000 PAUSE 100: CLS
2005 LET j=4: FOR i=6 TO 14
2010 PRINT  INK 5;AT i,j;"(5*ig8
,5*sp,5*ig8,5*sp,5*ig8)"
2020 NEXT i
2100 PRINT  INK 0;AT 8,5;"BCD";A
T 9,5;"EFG";AT 10,5;"HIJ";AT 11,
5; INK 2; INVERSE 1;"TOP";AT 13,
5;"HAT": INVERSE 0
2110 PRINT  INK 0;AT 8,15;"BCD";
AT 9,15;"EFG";AT 10,15;"HIJ";AT
11,15; INK 2; INVERSE 1;"TOP";AT
 13,15;"HAT": INVERSE 0
2120 PRINT  INK 0;AT 8,25;"KLM";
AT 9,25;"NOP";AT 10,25;"QRS";AT
11,25;"(sp)T(sp)";AT 13,24; INK
2; INVERSE 1;"BUNNY": INVERSE 0
2150 PAUSE 100
2200 RETURN
3000 IF a$="1" OR A$="4" THEN  P
RINT AT 6,4; INK 5;"(5*ig8)";AT
7,4;"(5*ig8)";AT 8,4;"(ig8)"; IN
K 0;"BCD"; INK 5;"(ig8)";AT 9,4;
"(ig8)"; INK 0;"EFG"; INK 5;"(ig
8)";AT 10,4;"(ig8)"; INK 0;"HIJ"
; INK 5;"(ig8)";AT 11,4;"(5*ig8)
";AT 12,4;"(5*ig8)";AT 13,4;"(5*
ig8)";AT 14,4;"(5*ig8)"
3010 IF a$="2" OR A$="4" THEN  P
RINT AT 6,14; INK 5;"(5*ig8)";AT
 7,14;"(5*ig8)";AT 8,14;"(ig8)";
 INK 0;"BCD"; INK 5;"(ig8)";AT 9
,14;"(ig8)"; INK 0;"EFG"; INK 5;
"(ig8)";AT 10,14;"(ig8)"; INK 0;
"HIJ"; INK 5;"(ig8)";AT 11,14;"(
5*ig8)";AT 12,14;"(5*ig8)";AT 13
,14;"(5*ig8)";AT 14,14;"(5*ig8)"
3020 IF a$="3" OR A$="4" THEN  P
RINT AT 6,24; INK 5;"(5*ig8)";AT
 7,24;"(5*ig8)";AT 8,24;"(ig8)";
 INK 0;"BCD"; INK 5;"(ig8)";AT 9
,24;"(ig8)"; INK 0;"EFG"; INK 5;
"(ig8)";AT 10,24;"(ig8)"; INK 0;
"HIJ"; INK 5;"(ig8)";AT 11,24;"(
5*ig8)";AT 12,24;"(5*ig8)";AT 13
,24;"(5*ig8)";AT 14,24;"(5*ig8)"
3050 PRINT  INK 2; FLASH 1;AT 20
,0;" WRONG TRY AGAIN "
3060 IF A$="4" THEN  PRINT AT 20
,0;"> HE HAS VANISHED <"
3070 RETURN
```

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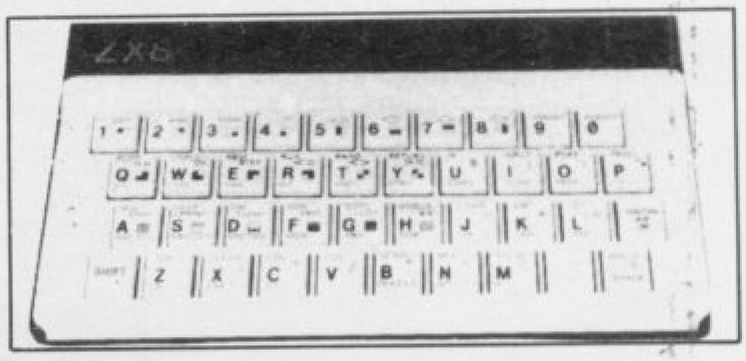


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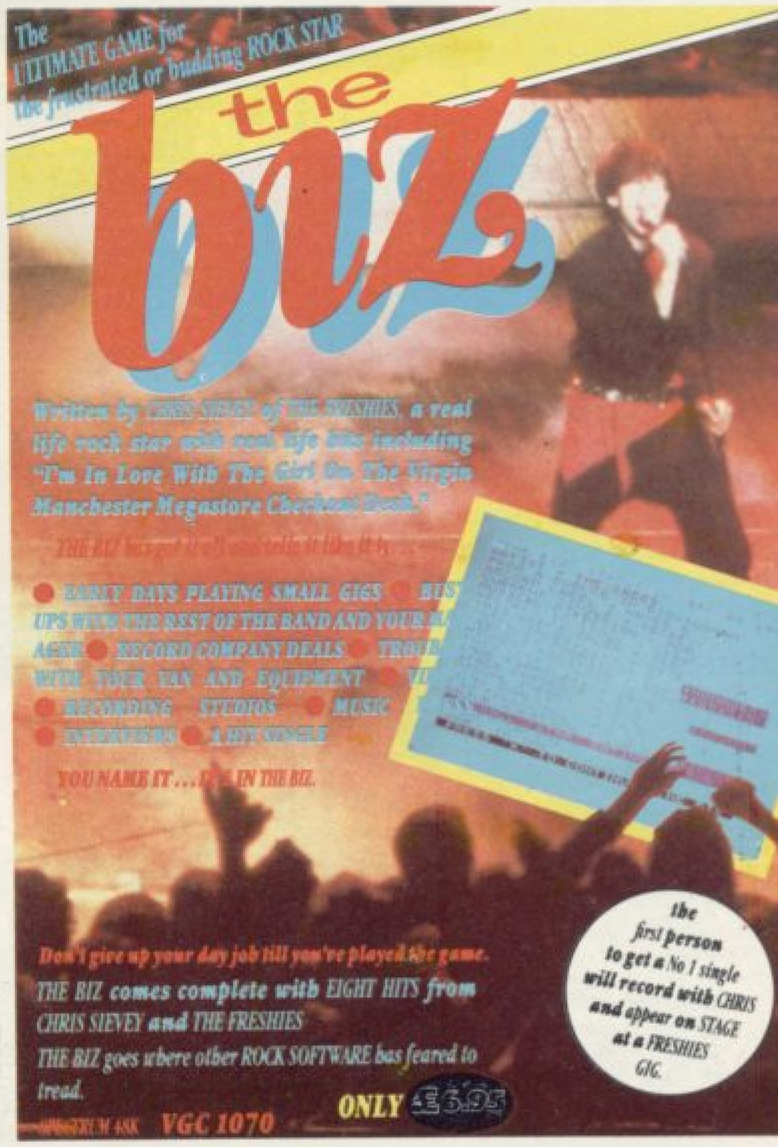
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to get a No 1 single
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at a FRESHIES
GIG.

Micro Magic

continued from page 145

top of the pack. Now place the other, shuffled, cards on top.

You are now ready to begin. Pick up the deck and show that all the cards are different. Do not alter the order of the cards. Note where the two jokers are, cut the pack at that point and hand the top half to someone to shuffle — these will be the cards that you removed to set up, at the beginning. The remaining cards are returned to the table.

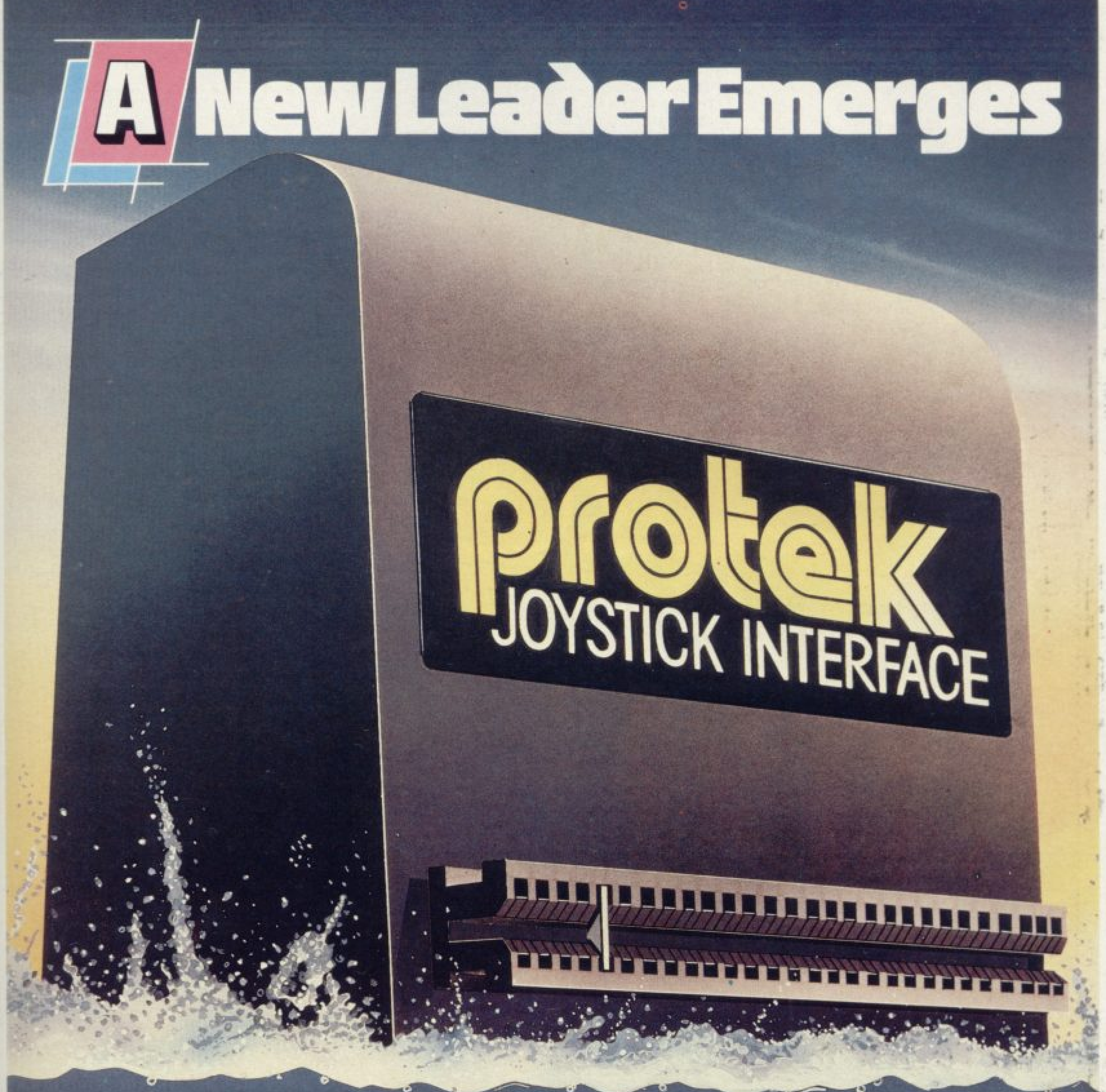
The rest of the instructions are contained within the program.

Computer Magic — Amazing Tricks on the ZX-81, by David Hambly. Price £3.00 from Martin Breese Publishing Ltd, 31, Richmond Way, Hammersmith, London W14.

The programs within the book will run on the Sinclair Spectrum.

Telepathic Computer

```
   2 BORDER 4: PAPER 7: INK 0: C
LS
   3 PRINT  INK 1;AT 10,6;"TELEP
ATHIC COMPUTER.";AT 12,9; INK 3;
"(A CARD TRICK)";AT 21,0; INK 0;
 Sheer Magic Software. 1984."
   4 GO SUB 9000
   5 PRINT AT 2,7;: GO SUB 570
   6 PAUSE 200
   8 GO SUB 110
   9 CLS
  10 LET q$="THE ACE OF SPADES"
  11 LET W$="THE TWO OF SPADES"
  12 LET E$="THE THREE OF SPADES
"
  13 LET R$="THE FOUR OF SPADES"
  14 LET T$="THE FIVE OF SPADES"
  15 LET Y$="THE SIX OF SPADES"
  16 LET U$="THE SEVEN OF HEARTS
"
  17 LET I$="THE EIGHT OF HEARTS
"
  18 LET O$="THE NINE OF HEARTS"
  19 LET P$="THE TEN OF HEARTS"
  20 LET A$="THE JACK OF HEARTS"
  21 LET S$="THE QUEEN OF HEARTS
"
  22 LET D$="THE KING OF HEARTS"
  23 LET F$="THE ACE OF CLUBS"
  24 LET G$="THE TWO OF CLUBS"
  25 LET H$="THE THREE OF CLUBS"
  26 LET J$="THE FOUR OF CLUBS"
  27 LET K$="THE FIVE OF CLUBS"
  28 LET L$="THE SIX OF CLUBS"
  29 LET Z$="THE SEVEN OF CLUBS"
  30 LET X$="THE EIGHT OF DIAMON
DS"
  31 LET C$="THE NINE OF DIAMOND
S"
  32 LET V$="THE TEN OF DIAMONDS
"
  33 LET B$="THE JACK OF DIAMOND
S"
  34 LET N$="THE QUEEN OF DIAMON
DS"
  35 LET M$="THE KING OF DIAMOND
S"
  38 PAPER 7: BRIGHT 1: CLS
  39 POKE 23609,255
  40 BEEP .05,4: PRINT '''' INK
2;"I WILL TELL YOU THE NAME OF T
HE CHOSEN CARD"
  42 PAUSE 150
  45 BEEP .05,5: PRINT : PRINT
INK 1;"TAKE A CARD AND REMEMBER
IT"
  47 PAUSE 150
  50 BEEP .05,6: PRINT : PRINT
INK 0;"THINK HARD OF YOUR CARD"
  55 PAUSE 100
  57 PRINT ''' INK 1;"(7*sp)ABE(
3*sp)"; INK 4;"FGO(3*sp)"; INK 3
;"PQR"
  58 PRINT  INK 2;"(7*sp)I"; INK
 6;"JK(3*sp)"; INK 2;"I"; INK 6;
"JK(3*sp)"; INK 2;"I"; INK 6;"JK
"
  59 PRINT  INK 2;"(7*sp)LM"; IN
K 6;"N(3*sp)"; INK 2;"LM"; INK 6
;"N(3*sp)"; INK 2;"LM"; INK 6;"M
"
  68 BEEP .05,7: PRINT : PRINT :
 PRINT  INK 6; PAPER 0; FLASH 1;
"PRESS ANY KEY WHEN YOU ARE READ
Y"
  70 PAUSE 0
  71 CLS
  75 GO TO 80
  80 IF INKEY$="q" THEN  PRINT '
'''"A S ";,,Q$
  81 IF INKEY$="w" THEN  PRINT '
'''"2 S S ";,,W$
  82 IF INKEY$="e" THEN  PRINT '
'''"3 S S S ";,,E$
  83 IF INKEY$="r" THEN  PRINT '.
'''"4 S S S S ";,,R$
  84 IF INKEY$="t" THEN  PRINT '
'''"5 S S S S S ";,,T$
  85 IF INKEY$="y" THEN  PRINT '
'''"6 S S S S S S ";,,Y$
  86 IF INKEY$="u" THEN  PRINT '
''' INK 2;"7 H H H H H H H ";,U$
  87 IF INKEY$="i" THEN  PRINT '
''' INK 2;"8 H H H H H H H H ";,
I$
  88 IF INKEY$="o" THEN  PRINT '
''' INK 2;"9 H H H H H H H H H "
;,O$
  89 IF INKEY$="p" THEN  PRINT '
''' INK 2;"T H H H H H H H H H H
 ";,P$
  90 IF INKEY$="a" THEN  PRINT
INK 1;'''"(3*sp)ABE",,; INK 2;"(
3*sp)I"; INK 6;"JK",,; INK 2;"(3
*sp)LM"; INK 6;"N",,; INK 0;A$
  91 IF INKEY$="s" THEN  PRINT '
'' INK 4;"(3*sp)FGO",,; INK 2;"(
3*sp)I"; INK 6;"JK",,; INK 2;"(3
*sp)LM"; INK 6;"N",,; INK 0;S$
  92 IF INKEY$="d" THEN  PRINT '
'' INK 3;"(3*sp)PQR",,; INK 2;"(
3*sp)I"; INK 6;"JK",,; INK 2;"(3
*sp)LM"; INK 6;"N",,; INK 0;D$
  93 IF INKEY$="f" THEN  PRINT '
'''"A C ",,;F$
  94 IF INKEY$="g" THEN  PRINT '
'''"2 C C ",,;G$
  95 IF INKEY$="h" THEN  PRINT '
'''"3 C C C ",,;H$
  96 IF INKEY$="j" THEN  PRINT '
'''"4 C C C C ",,;J$
  97 IF INKEY$="k" THEN  PRINT '
'''"5 C C C C C ",,;J$
  98 IF INKEY$="l" THEN  PRINT '
'''"6 C C C C C C ",,;L$
  99 IF INKEY$="z" THEN  PRINT '
'''"7 C C C C C C C ",;Z$
 100 IF INKEY$="x" THEN  PRINT '
''' INK 2;"8 D D D D D D D D ",;
X$
 101 IF INKEY$="c" THEN  PRINT '
''' INK 2;"9 D D D D D D D D D "
,;C$
 102 IF INKEY$="v" THEN  PRINT '
''' INK 2;"T D D D D D D D D D D
 ";,V$
 103 IF INKEY$="b" THEN  PRINT
INK 1;'''"(3*sp)ABE",,; INK 2;"(
3*sp)I"; INK 6;"JK",,; INK 2;"(3
*sp)LM"; INK 6;"N",,; INK 0;B$
 104 IF INKEY$="n" THEN  PRINT '
'' INK 4;"(3*sp)FGO",,; INK 2;"(
3*sp)I"; INK 6;"JK",,; INK 2;"(3
*sp)LM"; INK 6;"N",,; INK 0;N$
 105 IF INKEY$="m" THEN  PRINT '
'' INK 3;"(3*sp)PQR",,; INK 2;"(
3*sp)I"; INK 6;"JK",,; INK 2;"(3
*sp)LM"; INK 6;"N",,; INK 0;M$
 106 FOR i=1 TO 20
 107 BEEP .015,RND*40
 108 NEXT i
 109 PAUSE 300: GO TO 38
 110 CLS : PRINT AT 18,0;"Press
C for another go","Press S for t
he secret"
 115 PAUSE 0
 120 IF INKEY$="c" THEN  RETURN
 125 IF INKEY$="s" THEN  GO TO 1
50
 150 CLS
 155 PRINT "Each(2*sp)key(2*sp)h
as been allocated a card.(2*sp)T
his has been done in an easy to
remember order. Startingwith ""A
"" for the ACE OF SPADES, then "
"W"" for the TWO OF SPADES  and
so on. Because only 26 keys are
available, so only 26 cards are
named. (Check the listing to mak
e this clearer)"
 160 PRINT : PRINT "Start(2*sp)b
y(2*sp)having(2*sp)the named 26
cards, on the top of the deck.(2
*sp)Have(2*sp)someone(2*sp)cut o
ff this top half,and for them to
 shuffle the cards.(2*sp)Now get
 them to pick a card.(2*sp)Once
you have discovered what it is,
you will know which key to press
, for the card to be revealed."
 170 PRINT TAB 10; INK 2; FLASH
1;"SHEER MAGIC"
 180 PRINT "Press 0 to return"
 182 PAUSE 0
 185 IF INKEY$="0" THEN  RETURN
 570 PRINT ''' INK 1;"(7*sp)ABE(
3*sp)"; INK 4;"FGO(3*sp)"; INK 3
;"PQR"
 580 PRINT  INK 2;"(7*sp)I"; INK
 6;"JK(3*sp)"; INK 2;"I"; INK 6;
"JK(3*sp)"; INK 2;"I"; INK 6;"JK
"
 590 PRINT  INK 2;"(7*sp)LM"; IN
K 6;"N(3*sp)"; INK 2;"LM"; INK 6
;"N(3*sp)"; INK 2;"LM"; INK 6;"M
"
 600 RETURN
9000 RESTORE : FOR n=1 TO 20: RE
AD p$
9010 FOR f=0 TO 7
9020 READ a: POKE USR p$+f,a
9030 NEXT f
9040 NEXT n
9050 DATA "h",0,0,54,62,28,8,0,0
9055 DATA "d",0,0,8,28,62,28,8,0
9060 DATA "c",0,0,28,42,62,42,8,
0
9065 DATA "s",0,0,8,28,62,54,8,0
9070 DATA "t",0,94,82,82,82,82,9
4,0
9075 DATA "a",0,0,243,121,63,31,
15,7
9080 DATA "b",0,0,231,231,255,25
5,255,255
9085 DATA "e",0,0,207,158,252,24
8,240,244
9090 DATA "i",4,12,14,16,32,64,8
4,56
9095 DATA "j",84,85,42,21,10,10,
10,5
9100 DATA "k",160,80,144,88,164,
172,162,86
9105 DATA "l",8,4,24,16,16,15,1,
2
9110 DATA "m",5,5,5,29,98,191,0,
0
9115 DATA "n",82,86,82,82,212,88
,232,4
9120 DATA "f",0,0,240,121,63,31,
15,7
9125 DATA "g",0,0,195,231,255,60
,255,255
9130 DATA "o",0,0,15,158,252,248
,240,224
9135 DATA "p",0,0,255,121,48,16,
9,7
9140 DATA "q",0,0,255,231,195,19
5,231,25
9145 DATA "r",0,0,255,158,12,8,1
44,224
9150 RETURN
```



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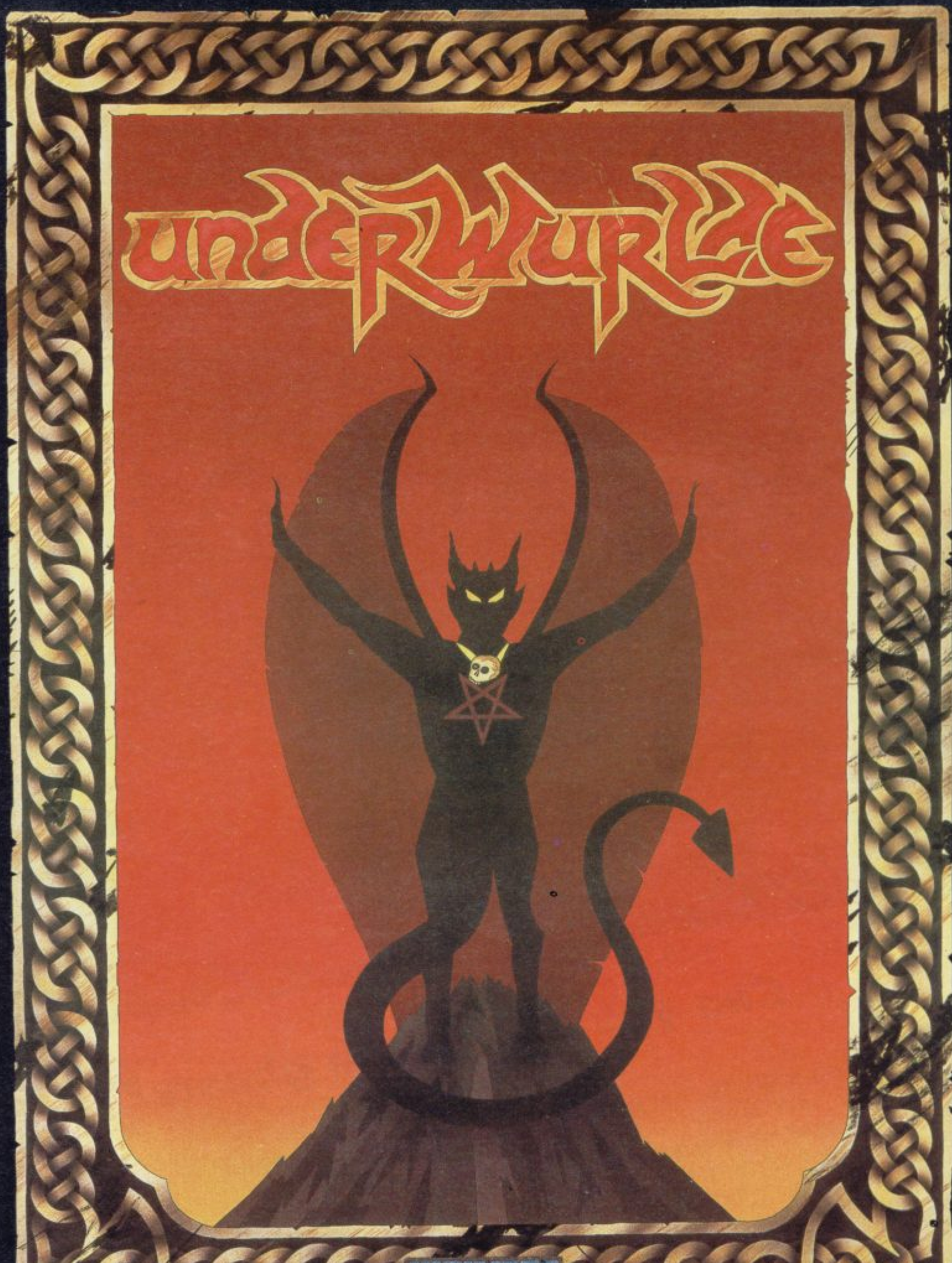
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Ghostbusters tells the story of three off-beat parapsychologists in New York who set up a totally lunatic business to fight the ghosts which are plaguing the city. The film is futuristic and fun and ideal family entertainment. The *Ghostbusters* theme music has already reached No 2 in the UK charts.

Coinciding with the release of the film, leading software manufacturer Activision is launching the computer game version for the Spectrum. Designed by *Decathlon* creator David Crane, the game is a mixture of adventure, strategy and arcade action in which it is up to you to infiltrate the evil Temple of Zuul and save the world. Armed with ghost vacuums, bait and traps you patrol the streets sucking up Slimers and Roamers and avoiding the dreaded Marshmallow Man. The game also features the *Ghostbusters* music and high-quality graphics.

We are giving away 100 copies of *Ghostbusters* to the winners of our festive supernatural quiz. All you have to do is some ghost busting of your own and identify the whereabouts of five famous spectres. Clues are given opposite. Write the answers, which should be the titles of a book, play, record, song and computer game — on a postcard together with your name, address and telephone number. Post it to: Ghostbusters Competition, *Sinclair User*, EMAP Publications, 67 Clerkenwell Road, London EC1R 5BH, to arrive not later than Friday, December 21. The first 100 correct entries pulled from the bag after that date will win the games.

Employees of EMAP Publications and Activision (UK), their relatives and associates are ineligible. Only one entry per person is permitted and the judges' decision is final.

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Designed exclusively for the ZX Spectrum, Protocol 4 brings you game control customising in a way that no other interface does. It can accept all commercially standard joysticks, including the Quickshot II with 'rapid fire' or Trackball controllers, and is compatible with ALL Spectrum software. **OPERATES LIKE FIXED OPTION INTERFACES OR CAN BE FULLY HARDWARE PROGRAMMED**

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Utilising Hardware Programmed technology you have the benefit of automatic eight direction control, no power-down programming loss, guaranteed conflict-free operation with other peripherals, including microdrives, and no extra software to load or awkward joystick movements and key presses to make each time you load another game. The keyboard remains fully operative at all times.

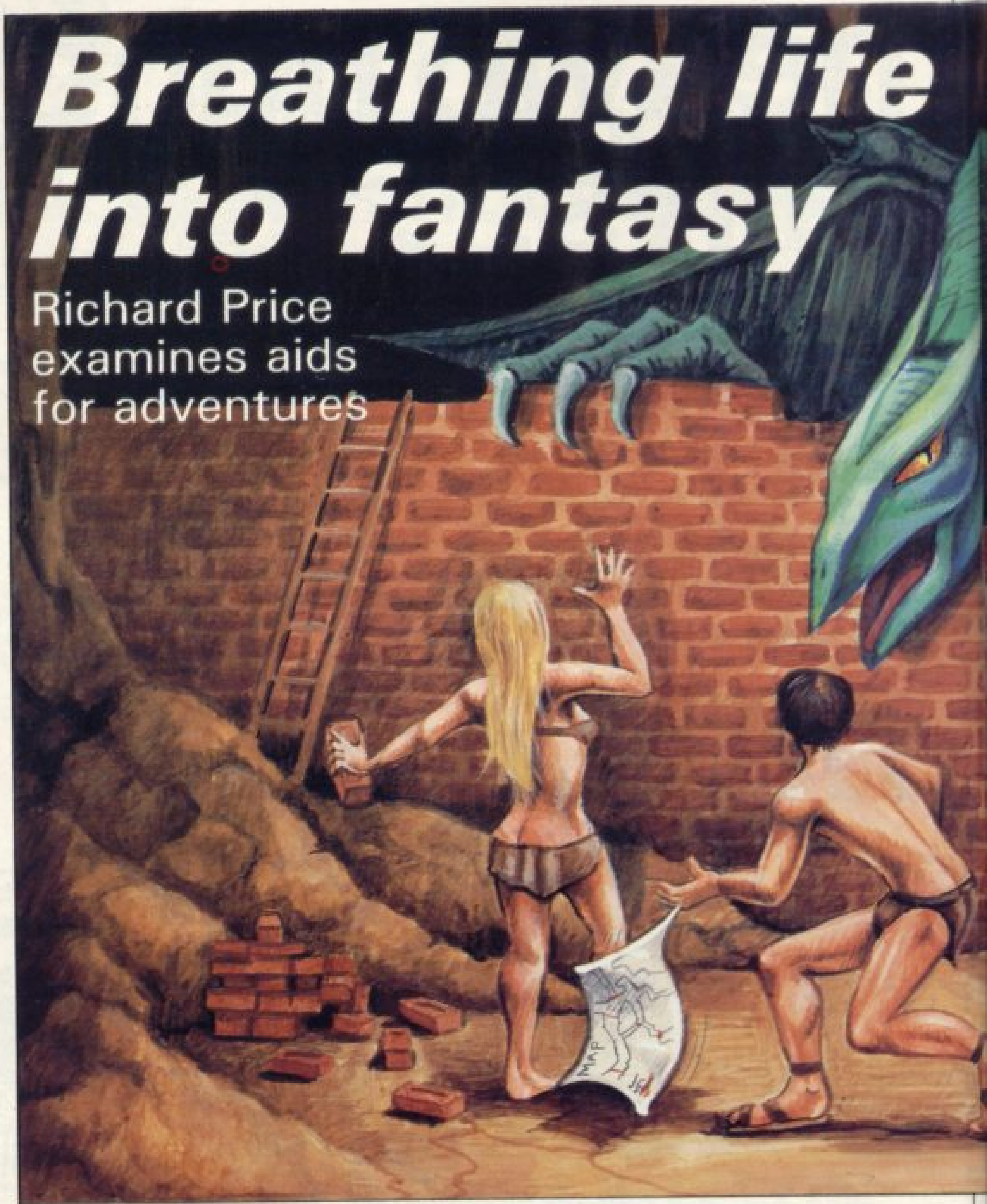
It is also perfectly possible to connect up to five Protocol 4's on one Spectrum, each programmed separately, for multiple player control — only possible with the hardware programmed design.

Incorporated into the design is a computer Reset button for clearing the computer memory between games without pulling the power plug out.

Fully guaranteed for 18 months, Protocol 4 comes supplied with five CustomCards, ten Quick Reference Programming Cards and complete instructions.

Breathing life into fantasy

Richard Price examines aids for adventures



AFTER THE LAST goblin has been offed or the top secret plans recovered from some rusty casket in the quicksands, do you sit back with a mild feeling of dissatisfaction and wonder whether you couldn't do just as well yourself?

Even if you can barely manage to program a nested loop in Basic it does not mean you cannot translate your feverish imaginings into electronic reality by creating your own adventure. You could be surprised to find your own game design is at least as exciting as a lot of the average and uninspiring offerings now on the market.

Don't kid yourself, though, that over a weekend you're going to churn out a program that will knock spots off the **The Hobbit.** Whether you write your programs or use tailor-made utilities, design and careful planning will require a great deal of time and paperwork before you even get started on the keyboard. Assuming you have a theme and a convincing setting the first priority will be a location map and its accompanying descriptions.

Drawing the map is a time-consuming process and it is best to use graph paper, leaving plenty of space between each box for notes, messages and so on. Print 'n' Plotter make a handy Adventure Chart with pre-drawn location boxes which should help simplify the task. The size of a large sketch pad has been produced primarily for players, but should be just as useful for games design.

Once a preliminary map is completed you will feel your fantasy world is taking shape. Adding descriptions will help put living flesh on those bare bones and, if the text is inventive, informative and atmospheric it will increase the game's playability enormously. Take a look at the superb Level 9 games to see how detailed text can add to the overall effect.

A word of warning — if you are a complete novice don't attempt a giant scenario with hundreds of locations. It's easier to practise on adventures with few locations and simple plots. Remember, too, that the Spectrum memory is limited and may not be able to cope with your dramatisation of *War and Peace* or the two thousand page *Chronicles of Ganglewoop* you have written in your spare time.

The next step is to work out all the likely interconnections between the locations, listing them meticulously. Objects and treasures — some obvious, some hidden — must be scattered around and you must decide what purpose they will have for the explorer of your world. It is probably that area of design which produces most difficulty as a game will stand or fall on the originality of its problems and puzzles. If they are too tough or obscure players are likely to give up in disgust. If they are too simple there will be little challenge or incentive to continue.

If you realise that a deduction problem will be impossible without help then put cryptic clues in the descriptions or the Help data. Anyone who has played **Mountains of Ket** will remember the magic word 'Polo' which gets you past the wall in 'mint condition'. Touches like that increase a program's attraction. Once again, you must keep track of all puzzles and the objects or conditions needed to solve them.

Next you face the task of developing the game vocabulary. It is essential to provide a variety of synonyms wherever possible. That increases versatility and should mean that players will not constantly see 'I can't do that' or similar reports on screen. It is occasionally useful to include an action which can be achieved only by a particular word combination but there is nothing more aggravating to the adventurer than searching through the entire Oxford English Dictionary for some obscure synonym.

Having created that large interlocking network of places, characters, objects and actions the major problem of getting your creation into the computer then pokes you in the eye. Don't panic. The market is well provided with books and programming utilities to help you. If you have little programming experience it is essential that you do some preparatory reading and practise. Many routines used in adventure are standard and, once learned, can be re-used time and again with new data.

Not all books on adventure programming are as useful as they may claim on



the back cover. One of the simplest and clearest is *Write Your Own Adventure Programs* from Osbourne. Jenny Tyler and Les Howarth have made no assumptions about their readership and write in an uncomplicated style, taking you step by step through the entire process. The book is not Spectrum-specific but includes a section showing all the necessary conversions into Sinclair Basic. ZX-81 owners will find that they also have not been forgotten. Like most other books it takes a model adventure as its base and uses pleasantly daft illustrations to demonstrate the various processes. At £1.99 the paperback is extremely good value and contains as much information as many of the more expensive tomes on the shelves. However, because it is not machine-specific it does not run a section on graphics — as if they mattered anyway.

Spectrum Adventures — Sunshine Books, £5.95 — by Tony Bridge and

continued on page 164

At the sign of THE DANCING OGRE



In a sleazy tavern at the back of beyond adventurers gather to tell tales or swap secrets. Mine host passes on the tips.

This month **The Hobbit** and **Valhalla** dominated the conversation. If you are stuck in The Hobbit Melbourne House has now produced *A Guide to Playing The Hobbit,* £3.95. That will answer many of the usual questions. If you scan your back issues of *Sinclair User* you will find that Quentin Heath wrote a series of articles on the game.

Anoushka Vydra from Okewood Hill, Surrey, is stuck in the goblin's dungeon and would also like to know how to get the Ring. Those are problems which many players have experienced. The first is easily resolved by asking Thorin to open the window. Once he has done that you must get him to carry you through it. You then enter the draughty corridors of the Goblin's lair. Once you are out of the Dungeon it is possible you may find the Ring in the corridors but it is more likely to be at the pool a little further on. If Gollum is there you can either kill him, which will reduce your final score, or attempt to answer his riddles. Beware! Gollum may try to strangle you without bothering with riddles.

Howard Dunn of Barton Staffordshire and Adam Mullery of Abergavenney say they have been stuck in Valhalla for a while now. It seems that many players cannot locate the objects. Never fear, John Rundle, 26 Western Road, Aldershot, Hampshire, claims to have all the answers and a full map. If you send him a stamped addressed envelope he is prepared to give you a fact-sheet.

Just for starters, Ofnir can be found by travelling to the Plain in Midgard. Then you must go north into Krank's hall with help from Boldir. Ofnir can be found in a locked chest in the hall to the north west but you must kill Krank to get there and will need further aid in opening the chest.

Artic's tough adventures always generate discussion. **Espionage Island** is troubling Christian Massey of Eastbourne (Tel. 24996) who cannot get further than the jungle trail. Michael Askew of Hengoed, Glamorgan, suggests that players should travel west from the clearing to the aircraft wreckage and find the dark corner. If you enter 'Touch corner' you will find a string. Pull it and you'll receive a string of beads. When given to a native woman those will earn a knife.

In **Planet of Death** the forcefield is a great obstacle to many players. Apparently it is passable by saying 'Open forcefield' twice into the loudspeaker and then enter 'dance'.

If you have a tale to tell, or are in need of a helping hand, write to the Landlord of the Dancing Ogre c/o Sinclair User, *67 Clerkenwell Road, London EC1R 5BH.*

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– Acorn User, July 84



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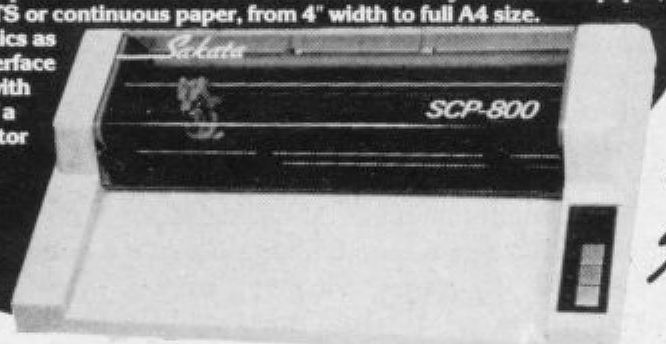
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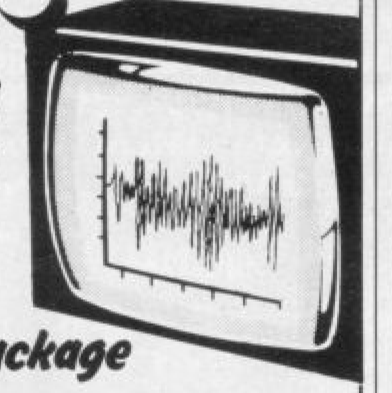
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continued from page 161

Roy Carnell is more sophisticated, more expensive. Like many of the large books it includes a history of the computer adventure whilst the main body of the book concentrates on the creation of a graphic adventure.

It is not to be recommended for beginners but if you want hints on the use of graphics it may prove useful. It contains information on combat sequences, in true Carnell D & D style, and has the full listing of a 48K game.

Adventures do not always stick to the preset location style. Robert Speel's paperback *New Adventure Systems for the Spectrum* — Fontana, £3.95 — gives listings and advice on a number of formats. Speel makes things easier by slicing up the programs into sections, each of which can be added to a foundation program. He tends to gloss over how the routines work and the use of Sinclair printer listings makes reading a bit daunting.

One of the best and most user-friendly guides is Peter Gerrard's *Exploring Adventures on the Spectrum 48K* — Duckworth, £6.95. The three sample programs are pure text games and the author discusses data handling concepts with clarity and some sympathy for those who wriggle in panic when phrases like 'numeric arrays' are bandied about.

As a general guide, beware of books which contain vast listings and precious little else. Those programs take time to type in and will not necessarily teach you much about the structures they use. Always go for books which provide adequate explanations.

If you are not prepared to devote the time required for developing programming skills you will have to obtain a commercial adventure-writing program.

The Quill is now justly famous and can produce machine-coded games of high quality and fast response. At £14.95 cheap it isn't but it offers the embryonic games designer a means of creating complex scenarios quickly and slickly without any programming knowledge at all. The program is menu driven and includes a comprehensive instruction booklet, and though the style is sometimes difficult it is worth persisting until you understand it.

Although a simple graphic set is included in the package The Quill is not intended for games needing complex graphics. You will find that there is room for about 30K of data, enough for lots of locations and fine detail. With imagination you will be able to make commercially viable adventures as others have done already — look at the software ads and you will see.

Dungeon Builder from Dream appears slightly more user-friendly than The Quill. It features a graphics capability using a sketch pad style to draw screens. The functions are manipulated by menus and the location map is shone on screen using a system of interconnecting cells. Regrettably, its available memory is quite limited — around 10K — and that is a disadvantage in creating large adventures.

The Dungeon Master — Crystal Computing — is a different kettle of fish. This game program allows you to create a monster-bashing scenario set in an underground labyrinth. All the hazards, treasures and options are predefined and give little scope for exercising your own imagination. You will not be able to use it to make standard text adventures but you should find it entertaining if you enjoy a bit of hacking and smashing.

It is often said that computer gaming is an essentially passive occupation, stunting the imagination and critical faculties. Anyone who has played adventure will know that to be an unjustified and sweeping generalisation. If you decide to go further and create your own adventures you will certainly extend your imaginative range and logical skills. You might even trawl a little brass on the way.


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Unwrapping the Spectrum +

Chris Bourne puts the new Spectrum through its paces and questions Sir Clive Sinclair on the reasoning behind his Christmas surprise.

LOOKING FOR ALL the world like a truncated QL, the new Spectrum burst upon an unsuspecting *Sinclair User* office on Monday 15th October. Well, not quite unsuspecting. There had been rumours for several months that Sinclair was going to put a real keyboard on a Spectrum, but the company has steadfastly denied them. The news was leaked on the Friday before the launch, and finally the tight-lipped men from Sinclair admitted that 'something sexy' was in the post.

Sexy it ain't, although like all Sinclair products there is something good and something less good about it. The Spectrum+, a name which hardly rolls off tongue nor typewriter, is exactly the same old Spectrum 48K with a solid keyboard attached, the whole presented very much in the style of the QL with sharp rather than rounded edges and similar ribbed black plastic.

It is larger than the Spectrum, measuring 320mm×140mm×40mm, nearly four inches longer. The keyboard itself is based directly on the QL keyboard, and utilises a rubber mat below the plastic keys rather than the direct contact between key and switching usually associated with professional keyboards. It should, according to Sir Clive Sinclair, be compatible with all available software, and any peripherals which will fit.

The touch is not as good as the very best keyboards already available for the Spectrum, although it is preferable to some of those at the lower range of the market. Because of the rubber mat, there is a certain amount of bounce in the keys, which is a cunning way of obtaining a semi-professional effect without paying professional prices for the parts. However, the weight required is not as even as it should be and the slight difference in give between different keys is mildly irritating for fast typing.

Sinclair has taken the opportunity to include a number of single function keys, which are a considerable advantage. They are DELETE, EDIT, GRAPHICS, INVERSE and TRUE VIDEO, CAPS LOCK, EXTENDED MODE and BREAK. The ENTER and CAPS SHIFT keys are suitably large, and there is a proper SPACE bar, although it is not as long as it would be on a real typewriter keyboard.

Further improvements to keyboard layout include giving a separate key each to "., and ; and bringing the cursor keys down to a position on both sides of the SPACE bar. The other functions of those keys remain on the top row, as before.

The net effect of the changes is to make it much easier to write programs using graphics and colour control codes, because the several key shifts required on the ordinary Spectrum become easier to follow using single-key entry. The punctuation marks are not such a good idea. It was certainly an improvement to give them their own single-touch keys, but the " and ; are tucked away in the bottom left corner, where nobody who had ever learned to type would think of looking for them.

The keywords and functions are all in white on the keys. Each key has a raised moulding contoured for fingers, and the legends within the moulding give the commands and letters obtained in K, G and L mode. The words outside the moulding are those features obtained in E mode. Unfortunately, Sinclair has abandoned the use of different colours to indicate the different modes.

"The keys are double-injection moulded," says Sir Clive, "which means they can never wear out. The words are not printed but moulded within the keys." Sir Clive says that if he had used that process with three colours, the whole keyboard would have been much more expensive.

That makes the keyboard much more confusing to read and undoubtedly will take away some of the speed advantage gained by using hard plastic keys. Novice programmers in particular will find it more frustrating to learn their way about the keyboard than they do with the help of those colours as a prompt.

But the most extraordinary thing about the keyboard is that it is actually smaller than the original in one important sense. Although the keys are larger than the original rubber pads, those pads were spaced out well, making it easier to hit the correct one and also providing more room for the printed key functions. On the new version the distance between the centre of two keys is fractionally less. The original keyboard was criticised for being small and cluttered, and in that respect the new one is no improvement.

The only other hardware change to the machine is the inclusion of a reset button on the left hand side of the plastic casing. That is a feature which should have been included on the original, and it is a relief to see Sinclair recognising the problems of wear and tear on the power socket at last. There is still no ON-OFF switch, however.



According to Sir Clive, the main target is customers thinking of buying the Commodore 64. "We did some market research last year," he says, "and discovered that although people thought the Spectrum was a superior machine they bought the 64 for the keyboard." Once the QL keyboard was developed, it was decided to produce a version for the Spectrum.

The Spectrum+ package also includes a new power pack to style, six commercial programs, the usual cassette and television leads, and a completely new manual and introductory cassette.

The manual has been written by one Neil Ardley and is published by Dorling Kindersley, publishers of the colourful *Screen Shot* series. It is much shorter than the old manual, having only 80 pages instead of 190.

continued on page 172

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continued from page 169

It is written in four sections with colour-coded margins. The first is Get Going, and provides a coherent guide to plugging the machine in without blowing.it, yourself, or the Christmas turkey up. There are diagrams of pink fingers pushing the correct buttons, photographs of what the screen should look like, and a flow chart for discovering the source of the problem. Following that there are some examples of short programs which produce pretty patterns to impress admiring friends and relations.

The second section deals with programming, and is much less comprehensive than the original manual. The section concentrates almost exclusively on graphics, with a short section at the end on sound. Concepts such as LET, FOR . . . NEXT loops and logical operations such as IF . . . THEN structures are mentioned almost in passing as the budding programmer is whisked through to the heady heights of assembling a program in which a spider descends to some pyramids while being shot at by a laser gun. Topics such as animation, attributes and user-defined graphics are explained, but it is not so much a guide to programming as an example of how to put a program together.

The third section is a brief explanation of the mechanics of the machine and the familiar diagrams of CPU, RAM chips and the like all connected by neat lines along which the information flows smoothly and in perfect discipline. It includes a memory map but no details of the system variables.

The final section gives a list of all the Basic commands and an explanation of how each one works. Brief examples are given, but even in combination with Section Two it falls way short of the uninspired but comprehensive guide provided by the original manual.

While the User Guide is a beautifully produced book with plenty of photographs and illustrations, its limitations are confusing. It seems aimed rather more towards a younger, games-orientated market, and does not, lamentably, provide a sufficiently organised course in programming to encourage newcomers to write anything very satisying for themselves.

Dorling Kindersley intends to market the Guide separately for £4.95, which seems a bit steep considering that Spectrum owners will already have a copy of the old manual. If you are still puzzled by the Spectrum graphics instructions, you might be enlightened by the Guide, but there are plenty of other books available in the same price range on the subject which contains much more information besides those simple points covered in both manual and guide.

It is thus unclear as to who would really want the Spectrum + . Those who are only interested in playing games will find the rubber keyboard as easy to use as the plastic one, and a joystick easier than both. Indeed, many of the standard interfaces, including the Kempston joystick and Centronics interfaces, will not fit the new machine, because their ports are obscured by the new casing.

On the other hand, those with serious applications, be they professional or home uses, will probably obtain better value for money buying a 48K rubber key Spectrum and one of the commercially available keyboards. For the £50.00 price difference you can choose from a wide range of keyboards, many of which are much more professional than the Sinclair one. If they can obtain a Spectrum with the Six-pack offer they will get almost the same software as is offered with the Spectrum + as well. Once the Six-pack offer is discontinued it becomes a much more attractive proposition.

It is therefore worth considering the Spectrum + not as a £180 computer but as a £50.00 keyboard. Single-key entry commands are not available on any commercial keyboard for the price, but for £10.00 more you could have a Stonechip, which also includes a BEEP amplifier and Load/Save switch. Further up the scale, at about £70.00, the Transform keyboard will give you a more professional feel as well as a numeric keypad and an on/off switch.

On a more comparable price level the Lo> > Profile and Saga keyboards offer well spaced keys with good touch but no single-entry keys. They make up for that deficiency by including several duplicate keys so that one or other of the SHIFT keys is always close at hand.

Sir Clive is convinced that the Spectrum + will increase his lead over the Commodore 64 in Britain, and make inroads on Commodore domination of the world market. "We feel that there are more serious users about, and that is reflected in the current software available," he says. "It could cut into sales of the QL, but then we are offering people a choice."

First time buyers should consider whether one of the other commercial keyboards would not be more suitable for their use. If you are looking for a word-processor you would probably put ease of typing at a premium and might prefer a keyboard such as the Transform, Saga or Lo> > Profile. But for programmers the Sinclair keyboard offers much greater flexibility of single-entry commands which will cut out some of the drudgery of programming, particularly where graphics are concerned.

Certainly no-one in their right mind is going to buy the Spectrum + if they already own a Spectrum. Sir Clive may have done the decent thing by typists' fingers at long last but there are limits.


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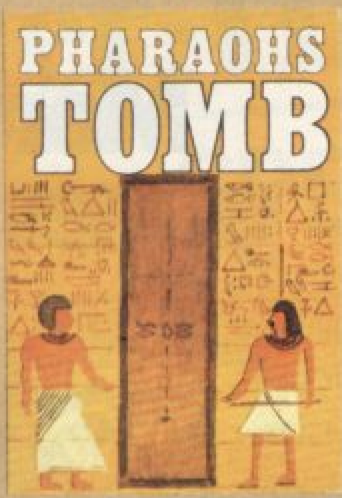
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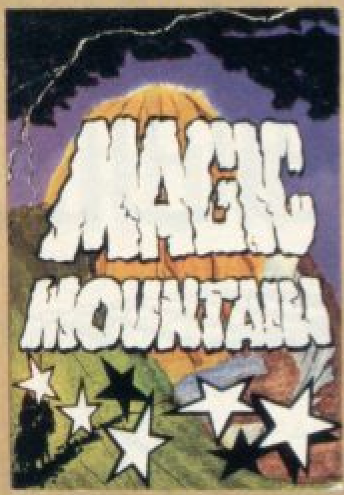
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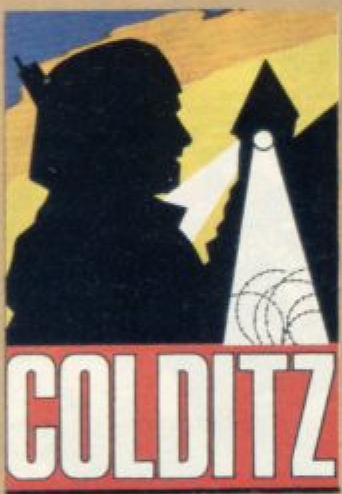
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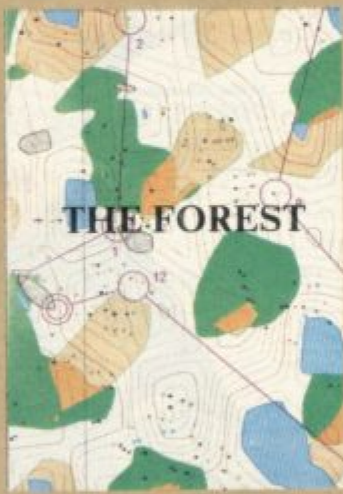
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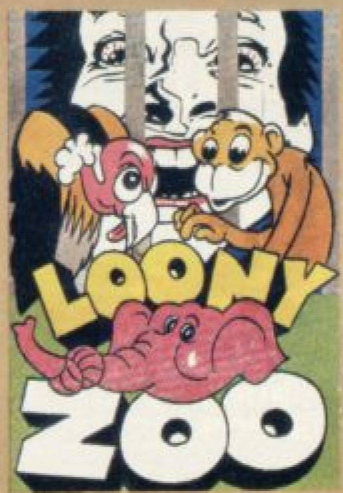
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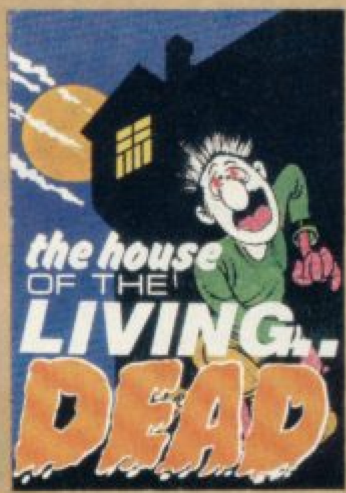
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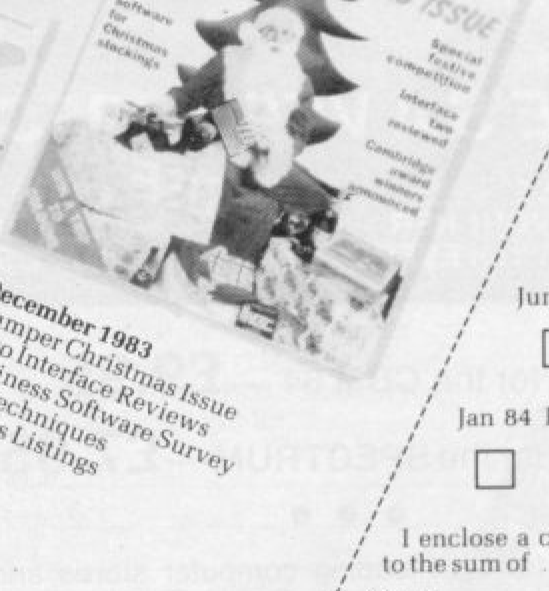
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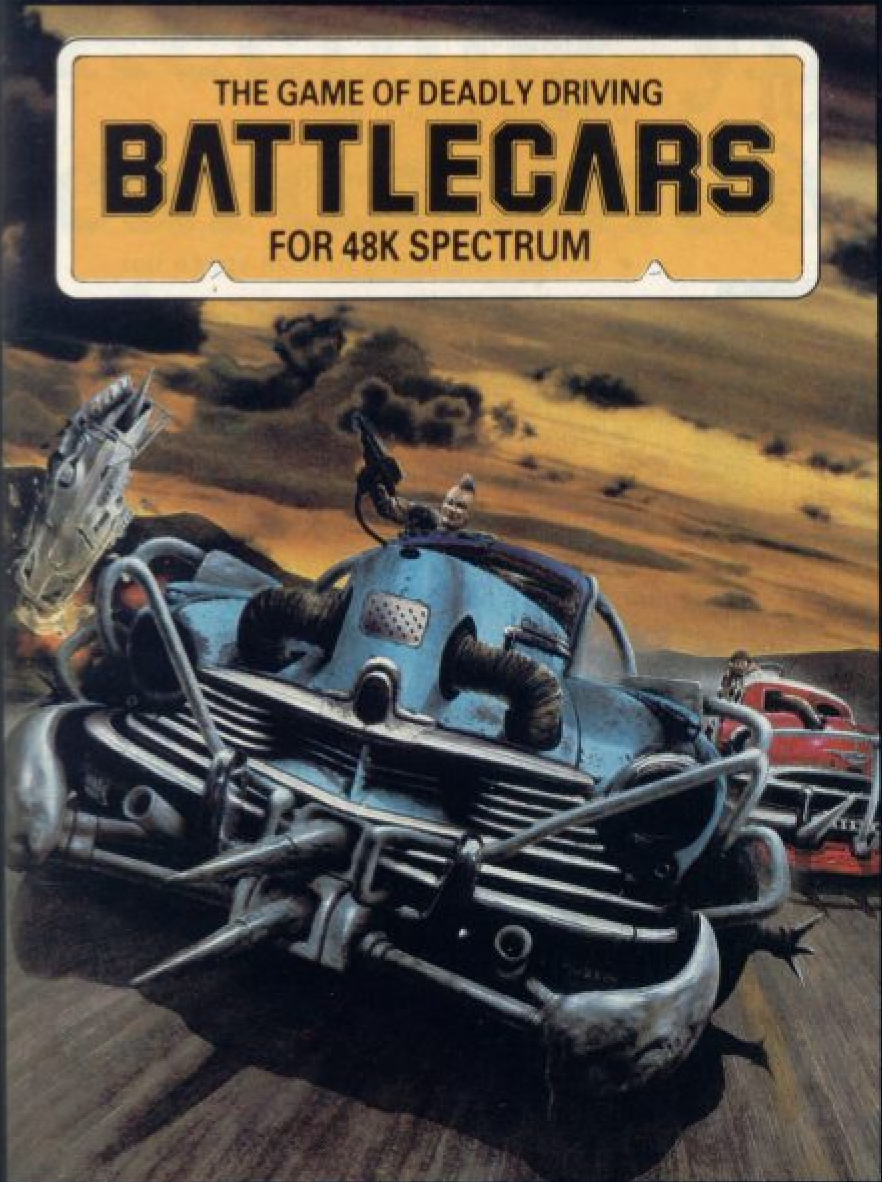
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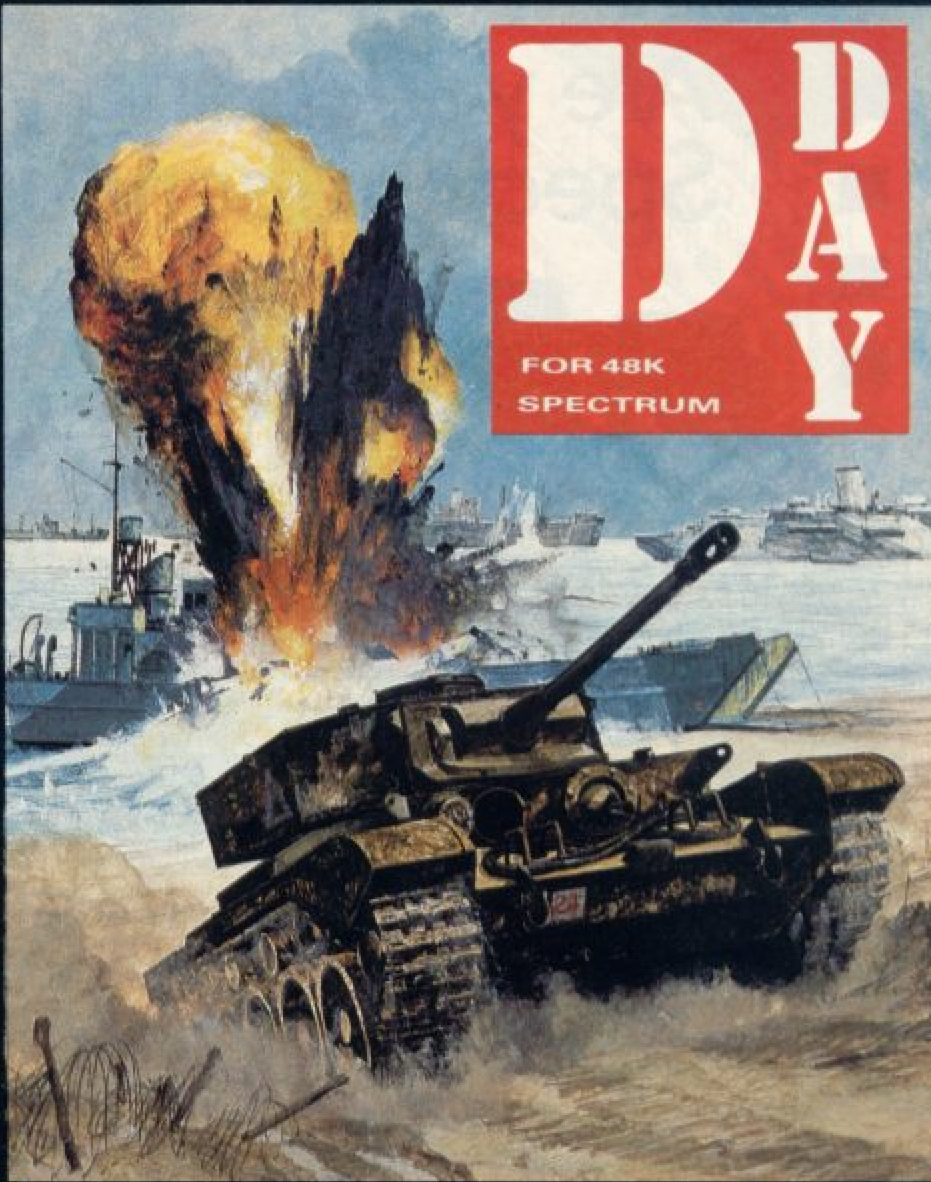
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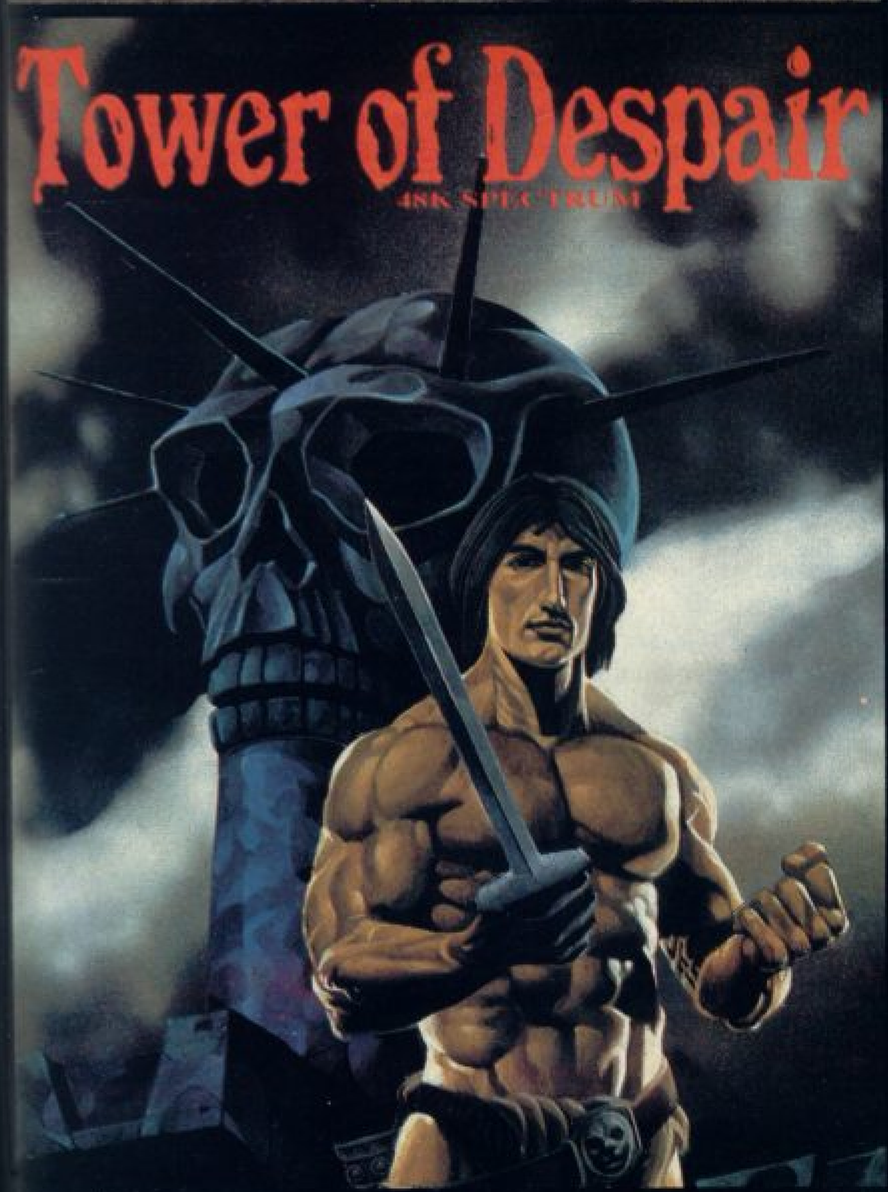
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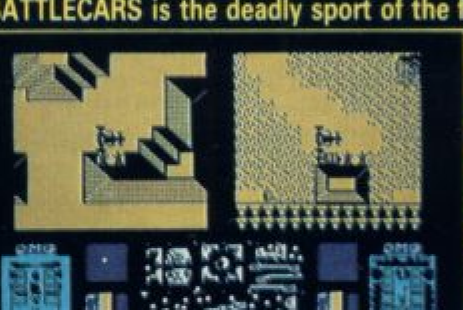




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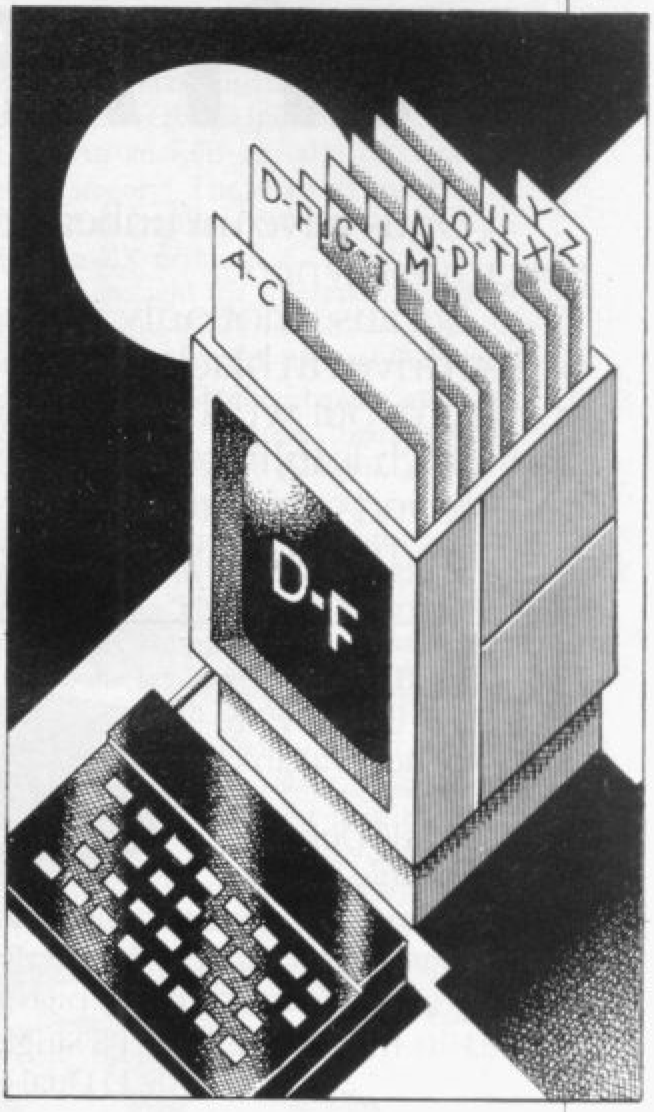
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Keeping your cards under close control



DATABASES vary in complexity from the simple card index type to the full relational database. **Keyfile** from Keysoft is of the card index type for the 48K Spectrum. The program is compatible with microdrive and the first option on loading from cassette is to save the program to microdrive.

Each record (a set of data on a subject) consists of one screen (the card) which can contain up to 40 different fields (individual pieces of information). At the start the layout of the screen must be established using option 1. That is done by setting the colour of the card and the ink used first. Text can then be entered at any point on the screen. The cursor keys are used to position the cursor prior to entering the text and the delete key — CAPS SHIFT and 0 — is used to correct any mistakes. Moving a piece of text involves deleting the original and then retyping at the new position. When you are satisfied with the layout pressing ENTER confirms and it is then impossible to use a different screen layout without reloading the program.

Once the card layout is ready the next step is to mark where the data will start for each field. You do that by using the ENTER key to mark the start of a field and E to return to the main menu when all the fields have been marked. The on screen instructions are unclear and you might find yourself back at the main menu having marked one field. If that happens it is impossible to further edit the layout. If a mistake has been made the whole program must be reloaded.

Once the card layout is satisfactory the data for individual records can be entered using option 3. The program prompts for each field in the order in which the starting points were fixed. The prompting makes entering data very easy. There are two restrictions on the data used. A field will only extend for one line — a maximum of 32 characters — and the first field entered must be unique as it is used as a reference for the record.

The file can be searched to find and display any record, although a search can only be done on the first field of your records. If you cannot remember the contents of the first field you can use the index option to list all the first fields or you can specify only those beginning with a particular character. You are given the choice of sending the list to the screen or to a ZX-type printer. The search is very fast and it takes virtually no time at all to produce the index, even for large files, although the names are listed in the order in which they were entered. Keyfile also distinguishes between capital and lower case letters.

Once your records have been stored it is almost certain that you will want to amend or delete one of them. That is easy, provided that amending a record does not involve having to use a different screen layout. Before a record can be amended or deleted it must be found by a search on the first fields. A prompt for the contents to be sought is given and when entered the record seems to appear in no time at all. If no record exists then you are informed by a loud beep and a flashing message. You are then prompted to either amend or delete the record. Deleting the record requires confirmation before it is deleted while amending the record prompts for each field in turn. Old entries are kept the same by pressing ENTER and amendments made by typing in the new field.

A search and copy option is also included in the main menu. That works in the same way as the search from the amend/delete option. After the record has been displayed on the screen you are given an opportunity to print it out before searching for another one or returning to the main menu.

Finally, you can load and save your records file to microdrive or tape or end the program. Both the saving and loading options ask for the filename first and then ask for a number from one to eight for a microdrive or "T" if you are using tape. Ending the program carries out a NEW command and returns to Basic.

The program will hold about 33,000 characters at one go. To help you plan how many more records you can enter a count of the number of bytes available is shown at the top of the main menu.

Your first impression of Keyfile is likely to be one of disappointment, although it appears easy to use. The problem lies only partly in the program. Getting the record layout correct, the positioning of the text and start of fields, is the difficult part. Your inability to return and amend the layout becomes a constant source of irritation, especially as the program has to be reloaded each time. However, once past that stage, Keyfile is simplicity itself to use. The speed of the machine code search is impressive as is the high degree of protection from silly responses to prompts. This is certainly a card file program to consider buying, but it is a pity that setting the layout was not more flexible.

Mike Wright

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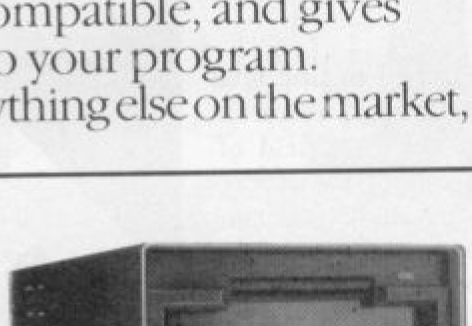
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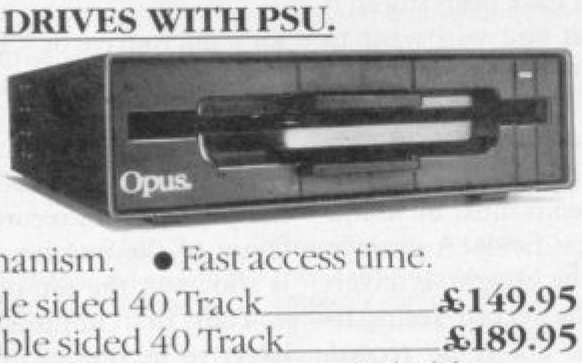
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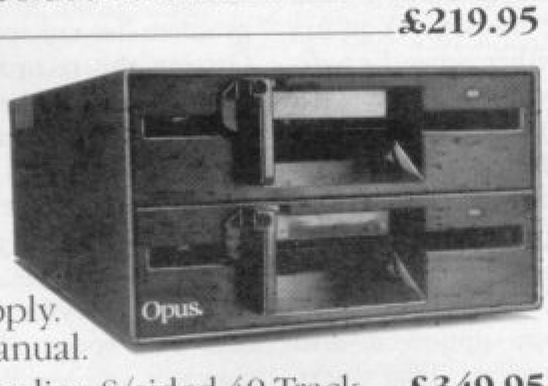
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Money-go-round

MONEY MANAGER from Creative Sparks is designed to help you plan your household budget. The program, which is not microdrive compatible, runs on the 48K Spectrum and is packaged in a plastic wallet. The manual is finely printed on a single strip of paper.

While the instructions are clear and concise I found them difficult to read because they are underprinted with the words Money Manager in a variety of green and blue inks. The most useful option of all, that of analysis, warrants only a passing mention while every other option is described more fully.

The program is menu-driven and although there is very little single-key entry, to select options a prompt line and flashing cursor are used to indicate that an entry is expected.

Money Manager allows you to define up to 50 categories of income and expenditure and to set monthly targets for each one over a twelve month period. On first loading the program you are asked to enter a filename, of up to 10 characters, for the data. That is used as the program name when the program and data are saved. It is also displayed when a version of the program that has been previously saved is loaded. When the filename has been entered the Main menu is displayed. That enables you to start a new financial year and set the opening balance, name the categories and assign budgets to them, and set the amount you actually spent or received in a month. Two other options allow you to compare aspects of your spending — or income — against the budgets and to calculate the approximate interest paid or received in a year. The standard option of 'save' is included but there is no 'load' option. Saving the data also saves the program so that by loading a saved version of the program the data is automatically loaded.

Selecting the near year option allows you to define the first month of your financial year, clear the actual and budget values (clear all) or clear the actual values and keep the budget values (carry forward). Selection of the clear options must be confirmed before the values are cleared.

Defining the categories and setting the budgets is easily done in option 2. Adding a category involves giving it a number between one and 50, a name of up to 12 characters, defining it as an income (i), or expenditure (e) category and assigning a letter as a class identifier. The class seems to have no practical use other than being necessary for the interest categories. It is not possible to analyse by class although that would seem to be a necessity and would make the program far more powerful.

Choosing to set a budget displays a list of months with the actual, budget and differences. One of the months is highlighted to show the budget which is to be set. Alternatively the same budget figure can be set for all months at once. Other options allow categories to be deleted, names to be changed and, if more than 21 categories are used, to display the next page of categories.

Any attempt to add a category number which already exists is ignored. However, a bug in the program causes any valid category number used after that to be rejected as well. It seems the only way out of that loop is to enter 'n' or 'x' to exit the main menu. When a category is deleted the actual and budget values are not. Consequently setting a new category using the old number has the same effect as changing the category name. That is a fault in the program but as new values have to be entered anyway it is hardly a major one.

Setting the actual values is done in the same way as the budgets without being able to set all values at once. That option is also used to change the actual values should you need to. All amounts are entered as whole pounds and minus signs are not used to denote expenditure as in some programs.

The analysis section is used to look at the differences — either absolute or percentage — between the budget and actual values in seven ways. Those include monthly income and expenditure, total income and expenditure, as well as monthly and cumulative cashflow — the difference between income and expenditure. An analysis can also be done for any category. The analyses can be displayed as graphs and both can be printed to a ZX printer.



At first sight the Interest Calculation option looks quite useful — after all, most people would like to know approximately what their bank charges are or how much interest their building society accounts are going to give. To use the option two special categories must be added before doing the interest calculation, one for income and one for expenditure. The interest rates for both categories are entered in the same way as for the set budget option. A budget figure for both overdraft and deposit interest is calculated by taking the simple interest on the monthly cashflow. Once the budget figures have been calculated the actual monthly values can be added. The main problem with the option is that it assumes all your excess money at the end of a month will earn interest and will therefore give a greater figure than can reasonably be expected.

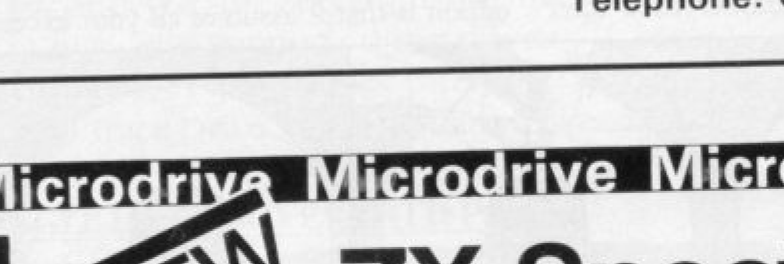
A major disadvantage of programs of this type is that of adding individual transactions to obtain the actual monthly values for each category. Overall, however, Money Manager is easy to use and the screen displays are clear and uncomplicated. The error trapping is very good and although there are a couple of bugs in it they will not corrupt your data.

Mike Wright

Creative Sparks, Thomson House, 296 Farnborough Road, Farnborough, Hants GU14 7NU.

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Memory: **48K**
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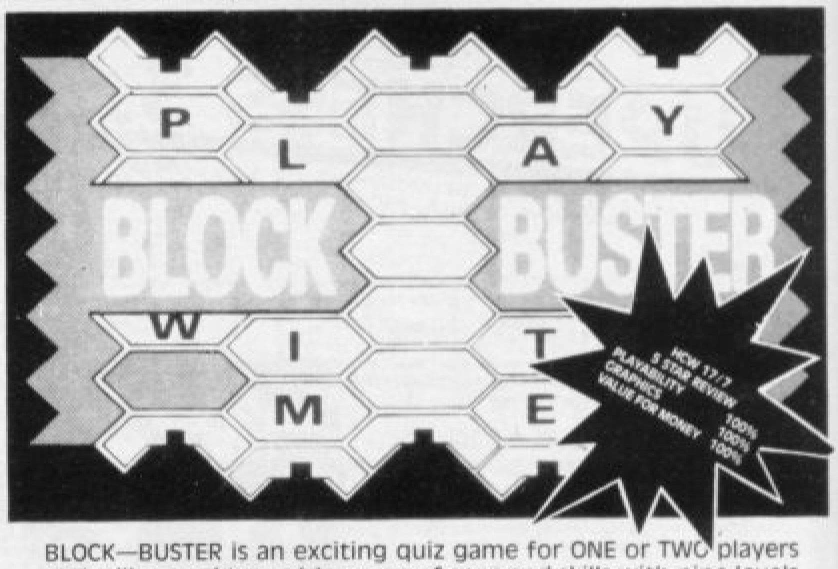
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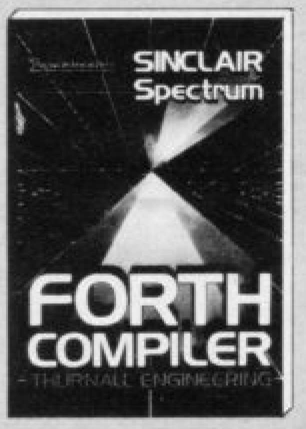
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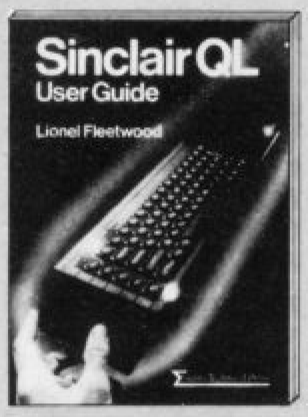
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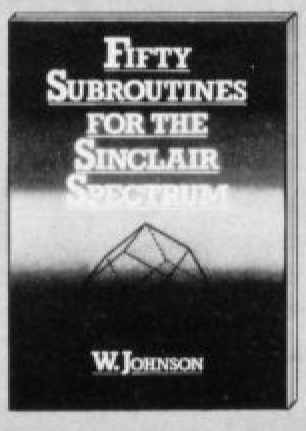
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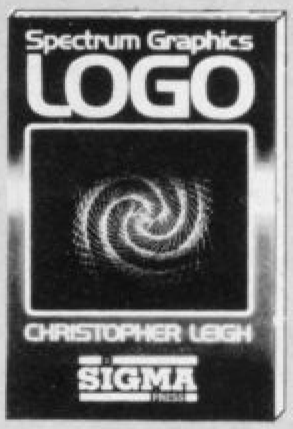
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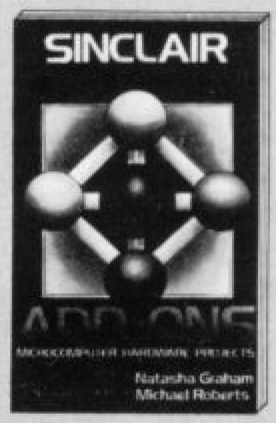
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Most displays are 64 characters wide. Jon Ellis squeezes more into the Spectrum screen.

ZX Condenser

ONE OF THE MANY annoying features of the Spectrum is the screen layout, 24 lines each of 32 characters, of which only 22 lines are usually available to the user. Many computers have the facility to put the more standard 40 characters — (or even 80 characters) — on a line. This utility alters the pitch of the Spectrum printing to give nine different character per line ratios. The routine also enables you to position text on the screen and to give it colour.

Although non-standard, 32 characters per line is a logical development from the way in which Sinclair designed the Spectrum screen. As you will know from user-definable graphics, a character on the Spectrum can be represented by a eight by eight grid of pixels. Since there are 256 pixels in the x direction, we may fit 256 divided by eight, or 32, of those pixel grids across the screen. What this utility does is to alter the size of the pixel grid used to represent a character.

If we decide that a character is to be made up of a six by eight pixel grid, then we will be able to fit 256 divided by six, or 42, characters per line, taking the integer part of the division only. Table 1 shows the effect of letting the size of the pixel grid range from six by eight to 15 by eight. Note that we are only altering the size of the grid which defines a character, not the size of the shape within the grid — i.e. what is being printed.

Table 1.

Size of grid	Characters per line	Value of F
6×8	42	6
7×8	36	7
8×8	32	8
9×8	28	9
10×8	25	10
11×8	23	11
12×8	21	12
13×8	19	13
14×8	18	14
15×8	17	15

It is easy to print characters in grids larger than eight by eight — all that needs to be done is to print each character of the text as normal, but inserting a gap of several pixels between successive characters. However, it is slightly more difficult to condense print from the standard print. How do we make the grid smaller? The answer to that can be found by looking at the design of the standard Sinclair character set.

Taking a non-graphic character such as the letter 'm', as in Figure 1, we see it has a border of blank pixels completely around the letter shape. What the program does is to clip off the left and right hand edges for the six by eight grid, or just the right hand edge for the seven by eight grid. The routine prints the first character of the text, and then moves along six, or seven, pixels before printing the second character; that procedure is followed for all the other characters in the text string.

Type in Listing 1 if you have an assembler. If a 16K version is required replace line 50 with
00050 ORG 32080
If you do not have an assembler, then type in either Listing 3 or Listing 4 as applicable.

Once you have finished typing, save the source program, and then create the object code (either by using the assembler, or by running the basic), which should then be saved by entering
SAVE "MULTIPITCH" CODE 32080,515 (16K)
or
SAVE "MULTIPITCH" CODE

```
10794 ***********************
00020 ;**  CHARACTERS  48k
00030 ;** by Jon Ellis 1984
00040 ;**********************
00050 ORG 64810
00060 FINDX LD IX,VARSC
00070       LD (IX+0),120
00080       CALL SCAN
00090       INC HL
00100       INC HL
00110       INC HL
00120       LD A,(HL)
00130       LD (XCOOR),A
00140 FINDY LD (IX+0),121
00150       CALL SCAN
00160       INC HL
00170       INC HL
00180       INC HL
00190       LD A,(HL)
00200       LD (YCOOR),A
00210 FINDF LD (IX+0),102
00220       CALL SCAN
00230       INC HL
00240       INC HL
00250       INC HL
00260       LD A,(HL)
00270       CP 6
00280       JR NC,INRNG
00290 ERR1  RST 8
00300       DEFB 25
00310 INRNG CP 16
00320       JR NC,ERR1
00330       LD (FONT),A
00340 FINDS LD (IX+0),83
00350       CALL SCAN
00360       INC HL
00370       LD E,(HL)
00380       INC HL
00390       LD D,(HL)
00400       INC HL
00410       JR INIT
00420 SCAN  LD HL,(23627)
00430 LOOP7 LD A,(HL)
00440       AND 224
00450       CP 96
00460       JR Z,TYPE1
00470       CP 160
00480       JR Z,TYPE2
00490       CP 128
00500       JR Z,TYPE3
00510       CP 224
00520       JR Z,TYPE4
00530       CP 64
00540       JR Z,TYPE5
00550       CP 192
00560       JR Z,TYPE3
00570 ERROR RST 8
00580       DEFB 1
00590 TYPE1 LD A,(HL)
00600       CP (IX+0)
00610       RET Z
00620       LD DE,6
00630       JR ADDA
00640 TYPE2 INC HL
00650       BIT 7,(HL)
00660       JR Z,TYPE2
00670       LD DE,6
00680       JR ADDA
00690 TYPE3 INC HL
00700       LD E,(HL)
00710       INC HL
00720       LD D,(HL)
00730       INC DE
00740       JR ADDA
00750 TYPE4 LD DE,19
00760       JR ADDA
00770 TYPE5 LD A,(HL)
00780       CP (IX+0)
00790       RET Z
00800       JR TYPE3
00810 ADDA  ADD HL,DE
00820       JR LOOP7
00830 INIT  PUSH HL
00840       PUSH DE
00850       LD A,(FONT)
00860       LD HL,256
00870       LD E,A
00880       LD D,0
00890       LD B,D
00900 LOOP5 INC B
00910       AND A
00920       SBC HL,DE
00930       JR NC,LOOP5
00940       DEC B
00950       LD HL,0
00960 LOOP6 ADD HL,DE
00970       DJNZ LOOP6
00980       DEC HL
00990       LD (MAX),HL
01000       POP DE
01010       POP HL
01020 START LD A,(HL)
01030       LD (CHAR),A
01040       PUSH HL
01050       PUSH DE
01060       CALL CHRS
01070       LD A,(FONT)
01080       CP 8
01090       JR NZ,STRT1
01100       LD A,(XCOOR)
01110       CP 241
01120       JR NC,ENDLN
01130       ADD A,8
01140       LD (XCOOR),A
01150       JR NXTCH
01160 STRT1 LD A,(XCOOR)
01170       LD L,A
01180       LD H,0
01190       LD A,(FONT)
01200       LD E,A
01210       LD D,H
01220       ADD HL,DE
01230       LD A,L
01240       LD (XCOOR),A
01250       LD DE,(MAX)
01260       AND A
01270       SBC HL,DE
01280       JR C,NXTCH
01290 ENDLN XOR A
01300       LD (XCOOR),A
01310       LD A,(YCOOR)
01320       SUB 8
01330       LD (YCOOR),A
01340       JR NC,NXTCH
01350       ADD A,8
01360       LD (YCOOR),A
01370       RES 0,(IY+2)
01380       CALL 3282
01390 NXTCH POP DE
01400       POP HL
01410       INC HL
01420       DEC DE
01430       LD A,E
01440       OR D
01450       JR NZ,START
01460       RET
01470 CHRS  LD A,(CHAR)
01480       CP 32
01490       JR NC,CHR1
01500       RST 16
01510       RET
01520 CHR1  CP 165
```

Listing 1.

64810,515 (48K)
Both the source program and the object code should be VERIFYed and the computer NEWed. Now type in Listing 2 — the demonstration program. Note that the program is written for the 48K machine; if you are using the 16K version then all the lines containing RANDOMIZE USR 64810 should be replaced with RANDOMIZE USR 32080.

A brief explanation of the assembly language listing, stage by stage follows.

FINDX: Routine which uses SCAN to find the value of the variable x, providing that it can be found in small integer form.

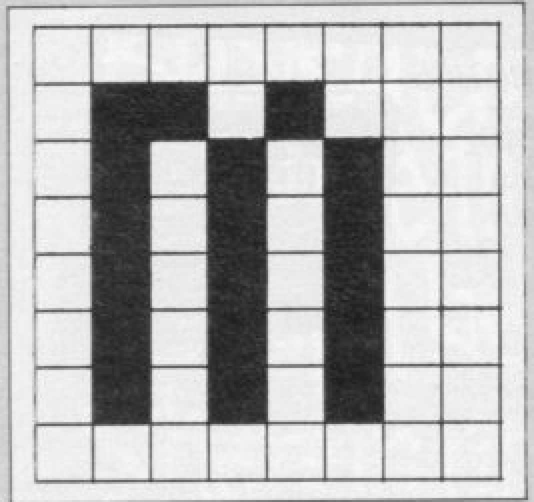


Figure 1.

FINDY: Finds the value of small integer y.

FINDF: Finds the value of small integer f, giving the report 'Q Parameter error' if the value is outside the range 6 to 15.

FINDS: Finds the start address and length of the text string S$.

SCAN: Subroutine which searches the variable area for the variable specified in VARSC. If the variable specified is not found then the report '2 Variable not found' is given. Note that the routine distinguishes between, for example, x as the control variable of a FOR-NEXT loop, and x as a simple numeric variable.

INIT: This calculates the maximum number of pixel grids on a line (the number of pixels in the grid in the x direction is defined by the simple numeric variable f).

START: This takes the characters from the string S$ sequentially and prints them, such that the specified number of pixels occur between successive characters. If there are more characters in the text string than can fit on the line, then the routine will automatically print to the end of that line and then carry on printing on a line eight pixels down. The routine ensures that a character may never straddle a line. If the message was begun on line 0 (the bottom of the screen) and has to be continued on the next line, or indeed, if any message runs out of space on the screen, the routine will automatically scroll the screen up eight pixel lines with no 'scroll?' prompt.

```
  50 LET S$="Trial message"
  60 LET X=10
  70 FOR G=160 TO 16 STEP -16
  80 LET F=INT ((G-16)/16+6)
  90 LET Y=G: PRINT AT 31-2*F,27
;"F=";F
 100 RANDOMIZE USR 32080
 110 NEXT G
 120 LET S$="PRESS ANY KEY TO CO
NTINUE"
 130 LET X=0: LET Y=0
 140 LET F=7
 150 RANDOMIZE USR 64810
 170 PAUSE 0: BEEP .8,30
 180 CLS
 190 LET S$="As an indication of
 the power ofthe utility, look a
t this text. See how much space
it takes up  in normal printing
(F=8),32 chrsper line"
 200 LET Y=167: LET X=0: LET F=8
 210 PRINT ;: RANDOMIZE USR 6481
0
 220 PRINT AT 6,0; PAPER 6;"Stri
ng length:";LEN S$;" characters"
 230 LET Y=88: LET F=6
 240 LET S$="And now look at thi
s message, printed withF=6 ( 42
characters per line ). Although
 this string is longer, much les
s screen   space is used."
 250 PRINT ;
 260 RANDOMIZE USR 64810
 270 PRINT AT 15,0; PAPER 6;"Str
ing length:";LEN S$;" characters
"
```

Listing 2.

CHRS: The first part of this subroutine finds out which kind of character is to be printed: control characters, those with codes less than 32, are

continued on page 196

```
01530       RET NC
01540       CP 144
01550       JR NC,UDGS
01560       CP 128
01570       JR NC,BLOCK
01580 NORML SUB 32
01590       LD DE,(CHARS)
01600       INC D
01610 MULT  LD L,A
01620       LD H,0
01630       ADD HL,HL
01640       ADD HL,HL
01650       ADD HL,HL
01660       ADD HL,DE
01670       LD DE,WORKS
01680       LD BC,8
01690       LDIR
01700       JR WHERE
01710 UDGS  SUB 144
01720       LD DE,(UDG)
01730       JR MULT
01740 BLOCK LD E,0
01750       SUB 128
01760       CP 8
01770       JR C,BLOK1
01780       LD B,A
01790       LD A,15
01800       SUB B
01810       LD E,255
01820 BLOK1 LD D,A
01830       LD B,2
01840       LD HL,WORKS
01850 LOOP1 PUSH BC
01860       XOR A
01870       RR D
01880       JR NC,SHIFT
01890       OR 240
01900 SHIFT SRL A
01910       SRL A
01920       SRL A
01930       SRL A
01940       RR D
01950       JR NC,BLOK2
01960       OR 240
01970 BLOK2 BIT 7,E
01980       JR Z,BLOK3
01990       AND A
02000       CPL
02010 BLOK3 LD B,4
02020 LOOP2 LD (HL),A
02030       INC HL
02040       DJNZ LOOP2
02050       POP BC
02060       DJNZ LOOP1
02070 WHERE LD A,(XCOOR)
02080       LD C,0
02090 LOOP3 INC C
02100       SUB 8
02110       JR NC,LOOP3
02120       DEC C
02130       ADD A,8
02140       LD (REMAN),A
02150       LD A,C
02160       LD (WHOLE),A
02170 PRINT LD B,8
02180       LD DE,WORKS
02190 LOOP4 LD A,(YCOOR)
02200       ADD A,B
02210       LD L,A
02220       LD A,176
02230       SUB L
02240       JR C,BACK
02250       PUSH BC
02260       LD B,A
02270       LD A,(WHOLE)
02280       LD C,A
02290       PUSH DE
02300       CALL ADDR
02310       PUSH HL
02320       CALL 3035
02330       POP HL
02340       PUSH HL
02350       LD A,(REMAN)
02360       INC HL
02370       CP 0
02380       CALL NZ,3035
02390       POP HL
02400       POP DE
02410       LD C,0
02420       LD A,(REMAN)
02430       CP C
02440       LD B,A
02450       LD A,(DE)
02460       JR Z,EXACT
02470 FRACT SRL A
02480       RR C
02490       DJNZ FRACT
02500 EXACT XOR (HL)
02510       LD (HL),A
02520       INC HL
02530       LD A,C
02540       XOR (HL)
02550       LD (HL),A
02560       POP BC
02570 BACK  INC DE
02580       DJNZ LOOP4
02590       RET
02600 ADDR  LD A,B
02610       AND 248
02620       RRA
02630       RRA
02640       RRA
02650       LD D,A
02660       AND 24
02670       ADD A,64
02680       LD H,A
02690       LD A,D
02700       AND 7
02710       RRCA
02720       RRCA
02730       RRCA
02740       ADD A,C
02750       LD L,A
02760       LD A,D
02770       RLA
02780       RLA
02790       RLA
02800       LD E,A
02810       LD A,B
02820       SUB E
02830       CP 0
02840       RET Z
02850 ADDR1 INC H
02860       DEC A
02870       JR NZ,ADDR1
02880       RET
02890 ;________________________
02900 ;***********************
02910 ;** FOR INTERNAL USE **
02920 ;***********************
02930 CHARS EQU 23606
02940 UDG   EQU 23675
02950 CHAR  DEFB 0
02960 XCOOR DEFB 0
02970 YCOOR DEFB 0
02980 FONT  DEFB 0
02990 VARSC DEFB 0
03000 MAX   DEFW 0
03010 REMAN DEFB 0
03020 WHOLE DEFB 0
03030 WORKS DEFM /00000000/
```

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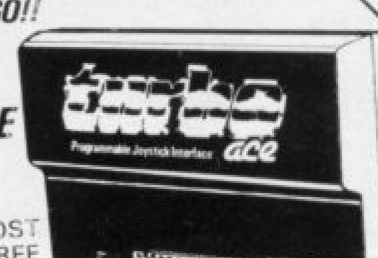
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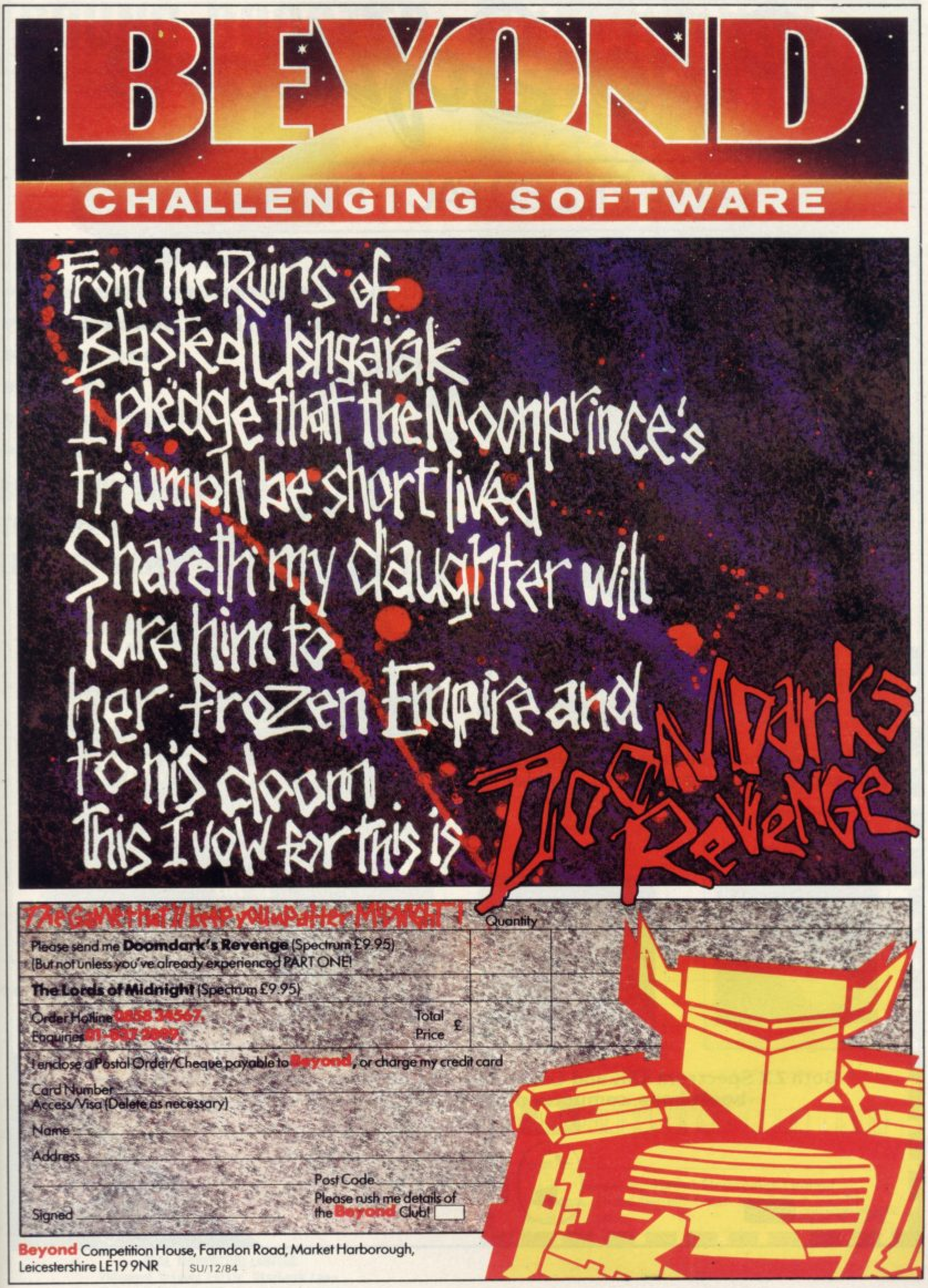
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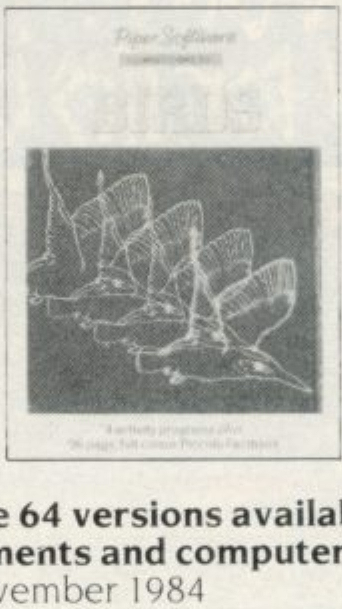
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Multipitch

continued from page 191

printed as normal; keyword tokens, characters with codes greater than 164, are not printed at all; any remaining characters are to be printed using the routine. Before a character can be printed the routine must find out where the data defining the character is stored. If the character is part of the 'normal' character set, i.e. its code is between 32 and 127 inclusive, then the bytes defining it are in the area starting at the address given by the system variable CHARS (23606)+256. If the character is a user-definable character, then the defining bytes are in the area pointed to by the system variable UDG (23675). If the character is a block graphic then the defining bytes are created by manipulating its character code. In all cases the 8 defining bytes are transferred to the workspace.

WHERE: This uses the current row and column values to find the correct address in the display file for each of the eight bytes of the character. It also colours the appropriate attribute squares.

The position at which text is started is defined by the values of the simple numeric variables x and y. X is the x coordinate of the pixel at the bottom left of the first character, and y is the y coordinate. If y is greater than 167 then part or all of the start of the text will be printed off the top of the screen.

The simple variable f contains the number of x pixels per character grid. For the relation between f and the characters printed per line, see Table 1.

The variables x and y follow the coordinate system for high resolution plotting as opposed to the PRINT AT coordinate system. That gives a range of 0 to 255 for x, and to 175 for y.

S$ contains the text to be printed and must be a simple string. To print an element of a string array, for example, element three of array X$, use LET S$=X$(3), and then proceed.

To set the colours of the text a PRINT line may be inserted before the call to Multipitch:

PRINT PAPER 3; INK 7; FLASH 1;
RANDOMIZE USR 64810/32080

would print the text in flashing white on magenta. If the required attribute value is known then it may be POKEd directly into ATTRT (23695).

Note that unless specified then the value will default to that held in BORDCR (23624).

It is a good idea to ensure that the parameters x, y and f are being held in small integer form, especially if their values are derived by calculation, by inserting the following line:

LET X=INT X: LET Y=INT Y: LET F=INT F

The colours of the text are always loaded into the attribute file in such a way as to ensure that all characters in the text are affected.

If you do not want to type the program in, then send a postal order for £2.50 to the author at 29 Ashridge Drive, Bricket Wood, St. Albans, Herts, AL2 3SR for a cassette.

```
  50 CLEAR 64809
  60 FOR F=64810 TO 65325
  70 READ A: POKE F,A
  80 NEXT F
 200 DATA 221,33,32,255,221,54,0
,120,205,112,253,35,35,35,126
 210 DATA 50,29,255,221,54,0,121
,205,112,253,35,35,35,126,50
 220 DATA 30,255,221,54,0,102,20
5,112,253,35,35,35,126,254,6
 230 DATA 48,2,207,25,254,16,48,
250,50,31,255,221,54,0,83
 240 DATA 205,112,253,35,94,35,8
6,35,24,74,42,75,92,126,230
 250 DATA 224,254,96,40,22,254,1
60,40,28,254,128,40,34,254,224
 260 DATA 40,37,254,64,40,38,254
,192,40,22,207,1,126,221,190
 270 DATA 0,200,17,6,0,24,29,35,
203,126,40,251,17,6,0
 280 DATA 24,19,35,94,35,86,19,2
4,12,17,19,0,24,7,126
 290 DATA 221,190,0,200,24,237,2
5,24,185,229,213,58,31,255,33
 300 DATA 0,1,95,22,0,66,4,167,2
37,82,48,250,5,33,0
 310 DATA 0,25,16,253,43,34,33,2
55,209,225,126,50,28,255,229
 320 DATA 213,205,51,254,58,31,2
55,254,8,32,14,58,29,255,254
 330 DATA 241,48,32,198,8,50,29,
255,24,51,58,29,255,111,38
 340 DATA 0,58,31,255,95,84,25,1
25,50,29,255,237,91,33,255
 350 DATA 167,237,82,56,26,175,5
0,29,255,58,30,255,214,8,50
 360 DATA 30,255,48,12,198,8,50,
30,255,253,203,2,134,205,210
 370 DATA 12,209,225,35,27,123,1
78,32,167,201,58,28,255,254,32
 380 DATA 48,2,215,201,254,165,2
08,254,144,48,28,254,128,48,32
 390 DATA 214,32,237,91,54,92,20
,111,38,0,41,41,41,25,17
 400 DATA 37,255,1,8,0,237,176,2
4,65,214,144,237,91,123,92
 410 DATA 24,231,30,0,214,128,25
4,8,56,6,71,62,15,144,30
 420 DATA 255,87,6,2,33,37,255,1
97,175,203,26,48,2,246,240
 430 DATA 203,63,203,63,203,63,2
03,63,203,26,48,2,246,240,203
 440 DATA 123,40,2,167,47,6,4,11
9,35,16,252,193,16,219,58
 450 DATA 29,255,14,0,12,214,8,4
8,251,13,198,8,50,35,255
 460 DATA 121,50,36,255,6,8,17,3
7,255,58,30,255,128,111,62
 470 DATA 176,149,56,50,197,71,5
8,36,255,79,213,205,249,254,229
 480 DATA 205,219,11,225,229,58,
35,255,35,254,0,196,219,11,225
 490 DATA 209,14,0,58,35,255,185
,71,26,40,6,203,63,203,25
 500 DATA 16,250,174,119,35,121,
174,119,193,19,16,193,201,120,23
0
 510 DATA 248,31,31,31,87,230,24
,198,64,103,122,230,7,15,15
 520 DATA 15,129,111,122,23,23,2
3,95,120,147,254,0,200,36,61
 530 DATA 32,252,201,76,64,10,6,
83,251,0,2,7,0,64,64
 540 DATA 64,64,64,126,0,0
```

Listing 3.

```
  50 CLEAR 32079
  60 FOR F=32080 TO 32594
  70 READ A: POKE F,A
  80 NEXT F
 200 DATA 221,33,70,127,221,54,0
,120,205,150,125,35,35,35,126
 210 DATA 50,67,127,221,54,0,121
,205,150,125,35,35,35,126,50
 220 DATA 68,127,221,54,0,102,20
5,150,125,35,35,35,126,254,6
 230 DATA 48,2,207,25,254,16,48,
250,50,69,127,221,54,0,83
 240 DATA 205,150,125,35,94,35,8
6,35,24,74,42,75,92,126,230
 250 DATA 224,254,96,40,22,254,1
60,40,28,254,128,40,34,254,224
 260 DATA 40,37,254,64,40,38,254
,192,40,22,207,1,126,221,190
 270 DATA 0,200,17,6,0,24,29,35,
203,126,40,251,17,6,0
 280 DATA 24,19,35,94,35,86,19,2
4,12,17,19,0,24,7,126
 290 DATA 221,190,0,200,24,237,2
5,24,185,229,213,58,69,127,33
 300 DATA 0,1,95,22,0,66,4,167,2
37,82,48,250,5,33,0
 310 DATA 0,25,16,253,43,34,71,1
27,209,225,126,50,66,127,229
 320 DATA 213,205,89,126,58,69,1
27,254,8,32,14,58,67,127,254
 330 DATA 241,48,32,198,8,50,67,
127,24,51,58,67,127,111,38
 340 DATA 0,58,69,127,95,84,25,1
25,50,67,127,237,91,71,127
 350 DATA 167,237,82,56,26,175,5
0,67,127,58,68,127,214,8,50
 360 DATA 68,127,48,12,198,8,50,
68,127,253,203,2,134,205,210
 370 DATA 12,209,225,35,27,123,1
78,32,167,201,58,66,127,254,32
 380 DATA 48,2,215,201,254,165,2
08,254,144,48,28,254,128,48,32
 390 DATA 214,32,237,91,54,92,20
,111,38,0,41,41,41,25,17
 400 DATA 75,127,1,8,0,237,176,2
4,65,214,144,237,91,123,92
 410 DATA 24,231,30,0,214,128,25
4,8,56,6,71,62,15,144,30
 420 DATA 255,87,6,2,33,75,127,1
97,175,203,26,48,2,246,240
 430 DATA 203,63,203,63,203,63,2
03,63,203,26,48,2,246,240,203
 440 DATA 123,40,2,167,47,6,4,11
9,35,16,252,193,16,219,58
 450 DATA 67,127,14,0,12,214,8,4
8,251,13,198,8,50,73,127
 460 DATA 121,50,74,127,6,8,17,7
5,127,58,68,127,128,111,62
 470 DATA 176,149,56,50,197,71,5
8,74,127,79,213,205,31,127,229
 480 DATA 205,219,11,225,229,58,
73,127,35,254,0,196,219,11,225
 490 DATA 209,14,0,58,73,127,185
,71,26,40,6,203,63,203,25
 500 DATA 16,250,174,119,35,121,
174,119,193,19,16,193,201,120,23
0
 510 DATA 248,31,31,31,87,230,24
,198,64,103,122,230,7,15,15
 520 DATA 15,129,111,122,23,23,2
3,95,120,147,254,0,200,36,61
 530 DATA 32,252,201,0,0,0,0,0,0
,0,0,0,48,48,48
 540 DATA 48,48,48,48,48
```

Listing 4.

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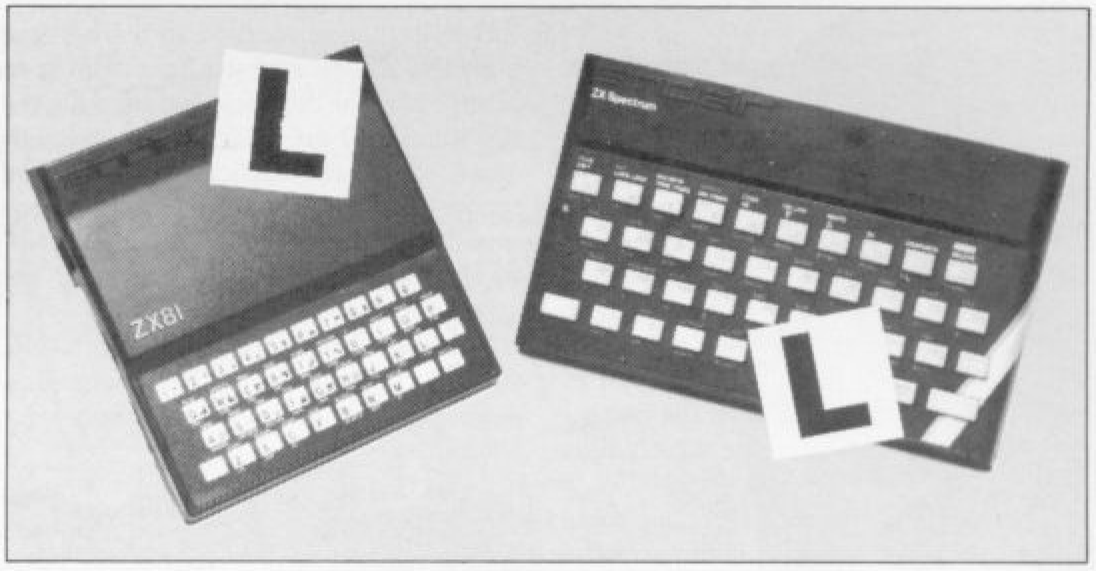
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GLOSSARY

Basic — Beginners' All-purpose Symbolic Instruction Code. A programming language resembling English which is used by beginners because most popular microcomputers have it as standard.
Bug — an error in a program.
EPROM — Erasable Programmable Read-Only Memory. Semi-permanent storage. Information is not erased if the power is turned off in the computer. Programs can be erased by subjecting the memory chips to ultra-violet light. The memory can then be re-programmed using an electrical device called an EPROM blower.
Interface — RS232 and Centronics. A device which enables other computers or add-ons, such as printers, to be connected to the computer. It converts non-standard signals from add-ons to the standard signals of the computer in use.
Kilobyte — (K). A measurement of memory size. Most machines use 16K as a minimum but 48K is generally agreed to be necessary for serious work.
Machine code — an electronic pulse code used by the computer to perform functions and communicate with memory and other devices.
Mnemonics — abbreviated instructions — for example LD for Load — used in machine language programming.
Motherboard — an external printed circuit board which is used like a multi-way plug planner. It enables other printed circuit boards, such as graphics boards and colour boards, to be slotted-in.
Port — a link to the outside world which can be used by programs and the computer.
PCB — printed circuit board. A board which has on it the electronic circuits of the computer.
RAM — Random Access Memory. Information and programs can be stored in this type of memory as electronic pulses which conform to a set of numbers — machine language — in which programs are represented in the computer. When the power is turned off the information will be lost.
ROM — Read Only Memory. Information stored in this type of memory is not lost when the power is switched off.
Software — programs which control the operation of the computer.
Syntax error — a bug caused by incorrect use of a programming language.



Our easy-to-follow guide for new owners

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the QL computer is big enough for use in small businesses, the Sinclair computers are not really suitable for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your system. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television set may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson. Recent changes in the ULA should make more sets compatible.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be

continued on page 202

continued from page 201

able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is important when using the ZX-81 that it is not jolted. Some of the connections can easily work loose and everything which has been entered will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

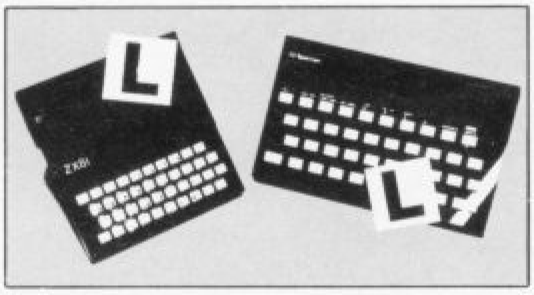
As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and



LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD "" followed by NEWLINE; then increase the volume of the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then re-wind the tape, the program should LOAD normally.

LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a Sinclair computer you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours.

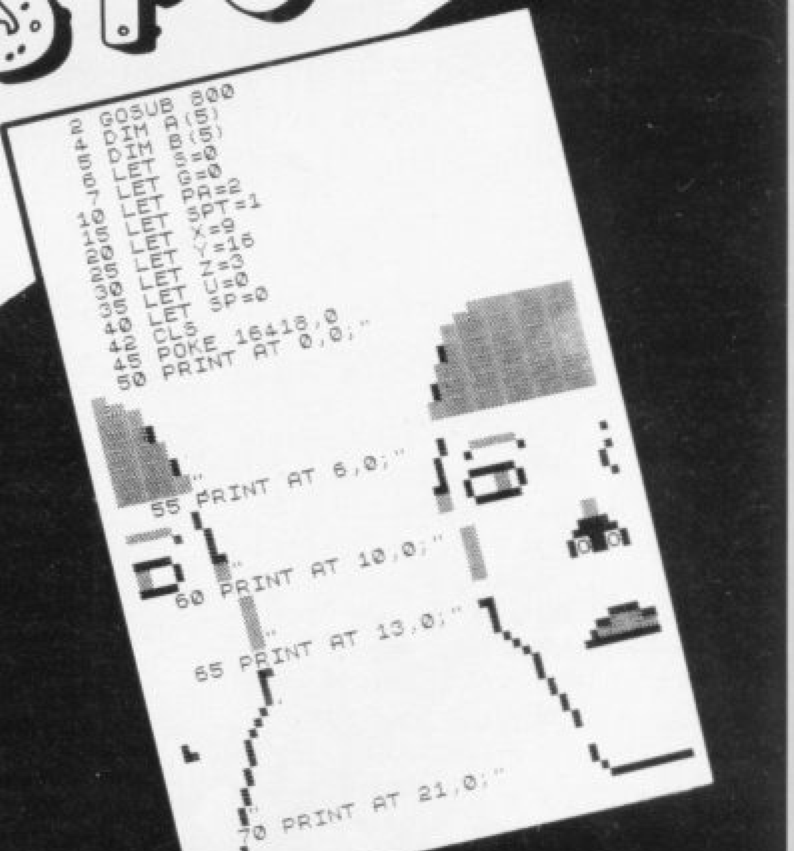
SPOTS

Fred has a personal problem. His face is full of spots. You control the spot bug which travels across Fred's face devouring the spots. Beware however, as you must avoid wandering over the sensitive parts of Fred's face. You must also clear away all the spots before Boris the spider steals your energy jar.

Spots was written on the 16K ZX-81 by Pascual Nicholson from Lowestoft in Suffolk.

Variables:

A( ), B( )	Arrays used to hold the positions of the spots on the face while they are being generated.
S	The score.
G	Your grade if you win.
PA	Controls the rate at which the spider descends.
SPT	The level.
X, Y	Co-ordinates for the spot bug.
Z	Indicates which key was last pressed.
U	The number of spots you have cleared.
SP	The vertical co-ordinate of the spider.
I	Used for most loops, in particular the main game loop, and thus indicates the number of moves.
J	Used for a loop within a I loop.
R, T	Used during the generation of the co-ordinates for the spots to store the initial random numbers.
Line 2	Immediately sends the program to the subroutine at line 800 which prints the instructions for the game.
Line 4–40	Set up initial values for some of the main variables in the program.
Line 45	16418 is the address of one of the ZX-81 system variables. In this case it is the store which holds the number of lines to be reserved at the bottom of the screen for error reports and the like. By POKEing zero into the store Pascual gives himself more space to draw the picture.
Lines 50–70	Print Fred's face onto the screen.



```
  72 PRINT AT 0,17;"SCORE ";TAB
17;S;AT 23,0;"LEVEL ";SPT;AT 18,
25;"  ";TAB 25;"FOR";TAB 25;"
 ";TAB 25;"   ";TAB 25;"
SPOTS";TAB 25;
  75 FOR I=1 TO SPT
  80 LET R=INT (RND*5)
  85 LET T=INT (RND*8)
  90 FOR J=1 TO I-1
  95 IF A(J)=R OR B(J)=T THEN GO
TO 80
 100 NEXT J
 105 LET A(I)=R
 110 LET B(I)=T
 115 PRINT AT INT (RND*5)+10,A(I
)+2;".";AT A(I)+10,INT (RND*6)+1
2;".";AT INT (RND*5)+17,B(I)+6;"
."
 120 NEXT I
 205 FOR I=16 TO 9 STEP -1
 210 PRINT AT I,27;"■";TAB 27;"
 "
 215 NEXT I
 220 FOR I=26 TO 19 STEP -1
 225 PRINT AT 9,I;"■"
 230 NEXT I
 235 PRINT AT 9,I+1;" "
 250 FOR I=0 TO 150
 255 PRINT AT X,Y;
 256 IF PEEK (PEEK 16398+256*PEE
K 16399)=27 THEN GOTO 400
 257 IF PEEK (PEEK 16398+256*PEE
K 16399)>1 AND PEEK (PEEK 16398+
256*PEEK 16399)<>27 THEN GOTO 70
0
 258 PRINT AT X,Y;"■"
 260 IF INKEY$="5" THEN LET Z=1
 265 IF INKEY$="8" THEN LET Z=2
 270 IF INKEY$="6" THEN LET Z=3
 275 IF INKEY$="7" THEN LET Z=4
 277 PRINT AT X,Y;" "
 280 IF Z=1 THEN LET Y=Y-1
 285 IF Z=2 THEN LET Y=Y+1
 290 IF Z=3 THEN LET X=X+1
 295 IF Z=4 THEN LET X=X-1
 300 IF I/PA=INT (I/PA) THEN LET
SP=SP+0.9
 305 IF I/PA=INT (I/PA) THEN PRI
NT AT SP,26;"   ";TAB 26;"   ";T
AB 26;"   "
 310 IF SP>=15 THEN GOTO 320
 315 NEXT I
 320 FOR I=1 TO 40
 322 PRINT AT 19,17;"THIEF";AT
19,17;"THIEF>"
 324 NEXT I
 326 FOR I=17 TO 2 STEP -1
 327 PRINT AT I-2,26;"   ";TAB 2
6;"   ";AT I,25;"   ";TAB 25;"F
OR";TAB 25;"SPOTS";TAB 25;"
 ";TAB 25;"    ";TAB 26;
" ";TAB 25;"  "
 330 NEXT I
 335 PRINT AT 0,26;"  ";TAB 25;"
  ";AT 2,25;"  ";TAB 25;"  "
";TAB 25;"  ";TAB 25;"
";TAB 25;"  "
 350 PRINT AT 19,16;"THE SPIDER
TOOK";TAB 16;"YOUR ENERGY JAR.";
TAB 16;"PRESS KEY (0) TO";TAB 16
;"PLAY AGAIN ..."
 358 IF INKEY$<>"0" THEN GOTO 35
8
 359 GOTO 6
 400 PRINT AT X,Y;"■"
 405 LET S=S+1
 410 LET U=U+1
 415 PRINT AT 1,17;S;AT X,Y;" "
 420 IF U=(3*SPT) THEN GOTO 500
 425 GOTO 250
 500 IF SPT=5 THEN GOTO 600
 502 PRINT AT 15,7;"  ";TAB
7;"  ";AT X,Y;"  ";AT 17,7;"
  ";TAB 7;"  ";AT 17,7;"
  ";TAB 7;"  "
 505 FOR I=1 TO 60
 510 PRINT AT 23,15;"WELL DONE";
AT 23,15;"WELL DONE"
 520 NEXT I
 525 PRINT AT 23,0;"HELP ,MORE S
POTS ....";AT 17,7;"    ";T
AB 7;"    ";AT 16,7;"    ";T
AB 7;"    "
 535 FOR I=1 TO 200
 540 NEXT I
 545 LET SPT=SPT+1
 550 LET PA=PA+1
 555 GOTO 20
 600 CLS
 602 LET G=G+1
 605 FOR I=1 TO 19
 610 PRINT AT I,0;"■";AT I,31;"■"
 615 NEXT I
 620 PRINT AT 0,0;"++++++++++++++++
++++++++++++++++";AT 20,0;"+++++
++++++++++++++++++++++++++++";
AT 3,11;"  SPOT  ";TAB 11;"
 ";TAB 11;"  ";TAB 11;"
CUP ";TAB 11;"  ";TAB 11;"
 ";TAB 11;"  "
 625 PRINT AT 12,2;"WELL DONE ,F
RED HAS AWARDED ";TAB 2;"YOU A S
POT CUP - GRADE ";G;TAB 2;"FOR D
OING A GOOD JOB ...."
 630 PRINT AT 17,2;"PRESS KEY (0
) TO CONTINUE ."
 640 IF INKEY$<>"0" THEN GOTO 64
0
 650 GOTO 10
 700 PRINT AT 17,25;"  ";TAB
25;"  ";TAB 25;"  ";TAB 25;"
  ";TAB 25;"  "
 705 FOR I=11 TO 17
 710 PRINT AT 8,3;"   ";AT 8,12
;"  ";AT 19,16;"DONT GO THERE";TAB
16;"THATS WHERE FRED";TAB 16;"K
16;"IS SENSITIVE,HIT";TAB 16;"K
EY (0) TO PLAY."
 715 PRINT AT 8,3;"   ";AT 8,12
;"   ";AT I,5;"O";AT I-1,5;" "
 720 IF INKEY$="0" THEN GOTO 6
 725 NEXT I
 730 PRINT AT 17,5;" "
 735 GOTO 705
 800 PRINT AT 1,10;"S P O T S"
 805 PRINT ,,"IN THIS GAME , YOU
THE SPOT-BUG MUST SCURRY AROUND
FREDS FACE  AND EAT THE SPOTS
BEFORE BORRIS,THE SPIDER STEALS
YOUR ENERGY   JAR .IF YOU MANAGE
TO AVOID    FREDS SENSITIVE PA
RTS (EARS,EYES,MOUTH,NOSE,HAIR
AND THE  OUT- LINE OF HIS FACE)
AND DO A GOOD JOB ,YOU WILL BE W
ELL REWARDED."
 810 PRINT AT 20,0;"PRESS KEY (0
) TO START GAME ..."
 815 IF INKEY$<>"0" THEN GOTO 81
5
 820 RETURN
 850 SAVE "SPOTS"
 860 RUN
```

Line 72	Print information for the player, and the energy jar.
Lines 75-120	There are to be three spots for each level, and the set of nested loops decides where they are to be printed. It is important to ensure the spots are not printed on one of the features of face. Line 115 makes sure of that by limiting the area to three specific sets of locations.
Lines 205-235	Animate the spot bug to move from the jar to the face. What would happen if you left out the " " at the end of lines 210 and 235?
Lines 250-315	The game itself—all the rest is presentation and setting up. Some of the best commercial games have very simple 'core' routines for playing the game and then use 90% of the memory for fancy graphics and polish.
Line 255	Sets the print position according to where the bug will next move to.
Line 256	Reads the screen to see whether there is a spot there. If there is the routine at 400-425 deletes the spot and adds to the score.
Line 257	Reads the screen to see whether there is part of the face there. If so you have lost and the routine at 700-720 shows Fred's eye blinking and a tear rolling down his check.
Line 258	Prints the bug in the new position.
Lines 260-275	Reads the keyboard to let you move the spot bug.
Line 277	Deletes the spot bug preparatory to your next move.
Lines 295	Alter the co-ordinates for the new spot bug position. Using the variable z instead of directly changing the co-ordinates from INKEY$—e.g. IF INKEY$="5" THEN LET Y=Y-1—means that if you do not press a key the computer will go on moving the bug according to the last key pressed.
Lines 300-315	Deal with the spider. The variable PA is set at 2 to start with, and the expression IF I/PA=INT (I/PA) will be true once in every two moves, I being the number of the move. If it is true then the spider moves down a space. On later levels PA will be larger so you will have more time to remove the spots. Line 310 checks to see if the spider has reached the energy jar.
Lines 320-359	Print the spider removing the jar and a description of what has happened.
Lines 400-425	The routine for deleting a spot. At line 420, if all the spots have been deleted the computer goes to line 500, the win routine.
Lines 500-555	You have cleared all the spots. If you are at level 5 the program jumps to the routine at 600 for an overall win. Otherwise you are given more spots to deal with, and SPT is adjusted for the level, and PA to slow the spider down. The picture is changed also to make Fred smile.
Lines 600-650	The final screen congratulating you on winning is printed.
Lines 700-735	The losing routine mentioned above.
Lines 800-820	The instructions subroutine.
Line 850	Do not worry about the inverse letter, just type a normal letter S. After checking the whole listing, type GOTO 850 and the program will SAVE itself, in such a state as to automatically RUN when LOADed again.

SOLITAIRE

The classic wooden peg game Solitare has been converted for any Spectrum by A R Bright of Stratford-upon-Avon in Warwickshire.

You have to remove all the pegs from the board by leaping over them in the manner of draughts. Leaps can be made over any adjacent peg, but not diagonally.

The program uses a flashing cursor to locate the pegs. Move it around the board using the cursor keys and then press 0 to choose the peg you want to move. Then press the cursor key corresponding to the direction you want to move in. The program will refuse all illegal moves. When you SAVE the program, use the instruction SAVE "name" LINE 1 and the program will automatically run itself.

Solitaire uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the program.

```
   1 CLS : PRINT AT 10,12;"LOADE
D": FOR n=1 TO 60: BEEP .009,20:
 NEXT n
   7 IF INKEY$<>"" THEN  GO TO 7
   8 IF INKEY$="" THEN  GO TO 8
   9 BORDER 0: PAPER 0: INK 7: C
LS
  10 GO SUB 9000
  20 DIM b$(9,9): LET xb=10: LET
 yb=6
  25 PRINT AT 0,10; BRIGHT 1; PA
PER 2; INK 6;"*SOLITAIRE*"
  30 FOR y=1 TO 9: FOR x=1 TO 9:
 IF y>3 AND y<7 OR x>3 AND x<7 T
HEN  PRINT AT y+yb,x+xb; PAPER 5
; INK 0;"A": LET b$(y,x)="A"
  40 NEXT x: NEXT y
  45 LET g=0
  50 LET b$(5,5)="E": PRINT AT 5
+yb,5+xb; PAPER 5; INK 2;"D"
  80 PLOT 87,47: DRAW 73,0: DRAW
 0,73: DRAW -73,0: DRAW 0,-73
 100 LET y=11: LET x=15
 105 PRINT #1;AT 1,0;"Select Peg
 to move(14*sp)"
 107 IF INKEY$<>"" THEN  GO TO 1
07
 120 PRINT AT y,x; OVER 1; BRIGH
T 1; INK 8; PAPER 8; FLASH 1;"(s
p)"
 130 LET a=x-xb: LET b=y-yb
 136 LET a$=INKEY$
 137 IF a$="q" OR a$="Q" THEN  P
RINT AT 20,0;g;" goes.": PRINT #
1;AT 1,0;"Press any key to resta
rt(8*sp)": GO TO 7
 140 IF a$="" THEN  GO TO 110
 145 IF a$="0" THEN  GO TO 500
 150 IF a$="5" OR a$="8" THEN  G
O TO 200
 160 IF a$<>"6" AND a$<>"7" THEN
  BEEP .2,-10: GO TO 110
 170 PRINT AT y,x; PAPER 8; OVER
 1; INK 8;"(sp)": LET y=y+(a$="6
" AND y<15)-(a$="7" AND y>7)
 180 GO TO 110
 200 PRINT AT y,x; OVER 1; PAPER
 8; INK 8;"(sp)"
 210 LET x=x+(a$="8" AND x<19)-(
a$="5" AND x>11)
 220 GO TO 110
 500 IF b$(b,a)<>"A" THEN  GO TO
 105
 505 IF INKEY$<>"" THEN  GO TO 5
05
 510 PRINT #1;AT 1,0;"Select dir
ection(16*sp)"
 520 LET a$=INKEY$: IF a$="" THE
N  GO TO 520
 530 IF a$="0" THEN  GO TO 105
 540 IF a$="6" THEN  GO TO 1000
 550 IF a$="5" THEN  GO TO 1100
 560 IF a$="7" THEN  GO TO 1200
 570 IF a$="8" THEN  GO TO 1300
 580 GO TO 520
1000 IF b>7 THEN  GO TO 500
1010 IF b$(b+1,a)="A" AND b$(b+2
,a)="E" THEN  LET yd=1: LET xd=0
: GO TO 2000
1020 GO TO 500
1100 IF a<3 THEN  GO TO 500
1110 IF b$(b,a-1)="A" AND b$(b,a
-2)="E" THEN  LET yd=0: LET xd=-
1: GO TO 2000
1120 GO TO 500
1200 IF b<3 THEN  GO TO 500
1210 IF b$(b-1,a)="A" AND b$(b-2
,a)="E" THEN  LET xd=0: LET yd=-
1: GO TO 2000
1220 GO TO 500
1300 IF a>7 THEN  GO TO 500
1310 IF b$(b,a+1)="A" AND b$(b,a
+2)="E" THEN  LET xd=1: LET yd=0
: GO TO 2000
1320 GO TO 500
2000 PRINT #1;AT 1,0;"Will Make
Move(18*sp)": BEEP .4,40
2010 PRINT AT y,x; PAPER 5; INK
2;"D": BEEP .2,5: LET b$(b,a)="E
": LET y=y+yd: LET x=x+xd: LET b
=b+yd: LET a=a+xd: PRINT AT y,x;
 PAPER 5; INK 2;"D": BEEP .3,30:
 LET b$(b,a)="E": LET y=y+yd: LE
T x=x+xd: LET b=b+yd: LET a=a+xd
: PRINT AT y,x; PAPER 5; INK 0;"
A"
2015 LET g=g+1
2020 BEEP .3,25: LET b$(b,a)="A"
: LET x=x-2*xd: LET y=y-2*yd: GO
 TO 105
9000 RESTORE : FOR n=1 TO 2: REA
D a$: FOR z=0 TO 7: READ a: POKE
 USR a$+z,a: NEXT z: NEXT n
9010 DATA "a",0,24,60,126,126,60
,24,0
9030 DATA "d",0,24,36,66,66,36,2
4,0
9100 RETURN
```

Trapping the errors will ensure first-time running

THE FIRST error code encountered by most Sinclair users is the flashing "S" on the ZX-81 or "?" on the Spectrum, which indicates a syntax error in a sentence. Experience and the manual soon show that it is caused usually by typing-in a keyword letter by letter, or by bad punctuation, for example omitting a semi-colon or an inverted comma.

The most frequently-occurring error code is "2" — variable not found. A variable is a letter which has been given a numeric value. When you enter "LET a=2" you are defining a variable. Error code 2 results when the computer reaches a variable in the program to which you have so far given no value.

Check the line which the computer specifies. If it is your program, give a value to the variable or remove it. If you are copying the program, look back in the listing to see which line you have missed.

Although the majority of error codes are explained adequately in the manuals, the report "B-Integer out of range" can be confusing. An integer is a whole number — 1 is an integer, 1.5 and 1½ are not. That code occurs most frequently when you try to print something beyond the limits of the screen.

PRINT AT 0,31; "a" is acceptable and will print a letter "a" at the top right of the screen. PRINT AT 0,32; "a" would not be possible. The integer 32 would be out of range, resulting in error code "B". That would also happen if the computer were instructed to PRINT AT 0,31;"ab". It would still be trying to print a character beyond the limits of the screen.

That error is more difficult to detect if variables have been used as co-ordinates and your character, or series of characters, is being printed in varying positions. If the instruction PRINT AT 0,x;"a" produces report code B, make sure that the value of x never increases beyond 31.

On the Spectrum "B-integer out of range" is also often found when you are POKEing-in user defined graphics. The biggest number which can be POKEd-in this case is 255 or BIN 11111111. In that case the error code will occur in the line containing the POKE statement. In most cases, though, the error will have occurred in one of the DATA lines in the program.

A very frequent error code produced on the Spectrum is "E-Out Of Data". That will occur in a line containing a READ statement. The error code, though, will have occurred in one of the program DATA lines, which may be nowhere near the READ line. A READ command sends the computer to a DATA line to collect the next piece of DATA contained there. That is often done using a FOR, NEXT loop, especially when graphics are being set up.

FOR n=1 TO 8: READ n will send the computer to the DATA lines eight times, for eight separate pieces of information. If there are only seven pieces of DATA there it will return to the READ line and produce the code OUT OF DATA. When there are several DATA lines they will all have to be checked, because the piece of DATA you have omitted was not necessarily the last.

In some cases the computer will follow the program correctly, without producing an error code, but from the programmer's point of view the program contains an error. In that case BREAK into the program at the moment it goes wrong. That will produce report code 9 and the line on which you have STOPped the program. That method makes it easy to locate the area of the program which contains the error.

Programs which you copy from magazines, books or from friends can be difficult to error-trap because they contain programming techniques which you have not yet learned, or simply because it is often difficult to follow another programmer's logic.

The flashing "S" or "?" indicating a syntax error may appear frequently. In that case check carefully what you have copied. You may not have recognised words such as LN or EXP as keywords.

On the ZX-81 especially it is easy to forget that pressing "π" will produce the word PI.

Make sure that when the "is not equal" sign, "<>" appears in a listing you always enter it as one character and not as "is less than", "<" followed by "is greater than", ">".

Technical problems can also cause errors in programs. Any alteration to the power supply can cause a program to CRASH. In that case the screen display may change dramatically and using the keyboard will have no effect. The only solution is to unplug your computer and begin again, making sure that your power supply and RAM pack are both connected firmly. That error is caused by the computer and not by the program.

> 'The error need not be on the line which produces the report; that is simply the line where the computer meets the problem'

Sometimes a program listing in a book or magazine will contain what seems to be a very obvious error. If it contains key words or symbols which are not on your computer, check that it is intended for your machine. Programs for the Spectrum, the ZX-81 and the ZX-80 are not usually directly interchangeable. If a program contains the command GOTO or GOSUB — a non-existent line number — the computer will simply go to the next numbered line after that one. That is a sign that a program has been developed and improved and is rarely an error.

When you have errors in a program, first check the report codes listed in Appendix B of the manual. It may then be necessary to read the appropriate section of the manual. Remember that the error is not necessarily on the line which produces the report code; that is simply the line where the computer meets the problem for the first time.

Always check carefully every line connected with the line containing the error code and the mistake should be easy to locate.



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Quentin Heath's Christmas Quiz

The master of strategy himself dips into his lore-books and sets ten demanding questions guaranteed to separate the trolls from the orcs.

CHRISTMAS IS traditionally a time for looking back at events of the past year and that is the theme of *Mind Games* this month.

You will have an opportunity to do some work for a change to see how good you are at adventure games. The puzzles are a jumble of traditional quizzes and brainteasers together with the practical applications of gaming illustrated in *Mind Games* earlier this year. Do not worry if you come across a problem that you cannot solve, hints will be given, sometimes as to where you can find the solution.

When you have done your best then consult the answers on page 238 to find how many you solved correctly. Then turn to the Gold Points section on this page and discover your mind game percentage score.

QUESTIONS

1. **Character Attributes.** In the October issue we discussed how characters within adventures can be created by setting up emotional and physical attributes within a matrix. Two matrices were given for characters showing their endurance, strength, lawful, and intelligence traits. Each of those were given a score between −10 and +10 where a positive sign showed the existence of that trait and negative sign showed the opposite of that trait. For instance, if Strength was −5 the character would be a weakling.

The two characters below are about to perform two actions. Firstly, they are going to argue. The loser of the argument will start a fight. Who is the loser of the argument and who wins that fight?

STAB	
Endurance	−1
Strength	+2
Lawful	+3
Intelligence	+8

Figure 1a.

SLAYMORE	
Endurance	+2
Strength	+4
Lawful	−3
Intelligence	−1

Figure 1b.

2. **Lords of Midnight.** What are the initials of the writer of the famous graphics adventure? Which two characters must fulfil the quests of the game?

3. **Wrath of Magra.** Which company took over Carnell Software in August? Name the adventures which make up the Third Continent Trilogy.



4. **Chess Techniques.** In the May issue of *Sinclair User* we described techniques for writing strategy games. What is a tree structure? Is it an infinite or absolute structure?

5. **The Hulk.** The jolly green giant thundered into the magazine in September, courtesy of Adventure International. Who wrote the game and where does it start? How does Banner become The Hulk? Clues for those questions can also be found in Marvel Superheroes comics.

6. **Mad Martha.** In the very successful game from MikroGen Martha was anything but a poor battered wife. She did most of the battering with an axe and it was her husband who suffered. What is the name of her husband who managed to survive the attempts on his life and went on to have his night out in **Mad Martha Two?**

7. **Valhalla.** How can you travel around the adventure without having to walk? Name one of the quest objects hidden in the adventure.

8. **The Hobbit.** How do you cross the Black River? Where is the ring? Who has the pleasure of killing Smaug the dragon and with what?

9. **Sherlock.** From which station must the famous detective leave to find his quarry and how does he get to that station? Who has been murdered? What is the name of the newspaper from which Watson gets most of his news?

10. **Lords of Time.** What is the mode of transport which the time traveller must take? How many time periods are there? Where can you hide your cache of discoveries? Answers to some of those questions can be found in April's *Mind Games.*

Gold Points

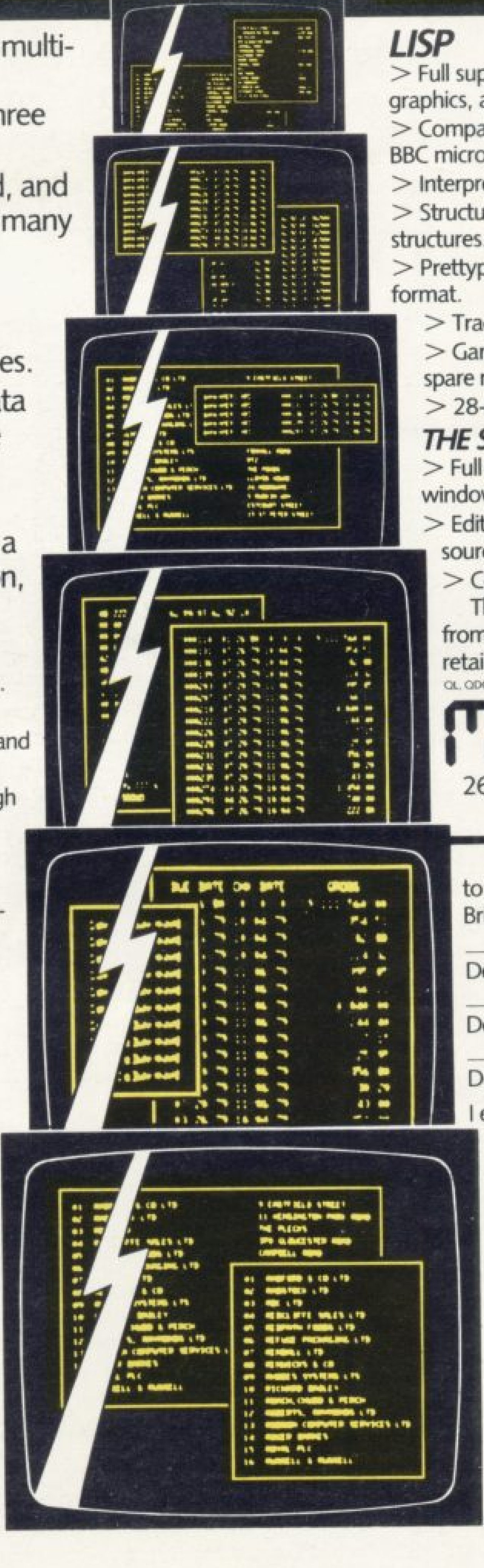
In order to find your percentage score:

1. give yourself 10 points for every correct answer. The top score possible is 220;
2. divide the score by 11 and multiply the result by five. You will then have a percentage score.

When you have done all that you will have your *Mind Games* Rating. Compare it with the chart below and you will see the level of understanding that you have of the market.

Percent	Level	Explanation
0–10	Beginner	Mind games and adventures are not really your forte are they?
10–25	Minor Mage	Learning, but could do better.
25–50	Puzzler	After much thought and with luck you can succeed.
50–75	Keeper of Secrets	You know all the answers.
75–100	Master Mage	Such games are meant for mortals not for those such as you.

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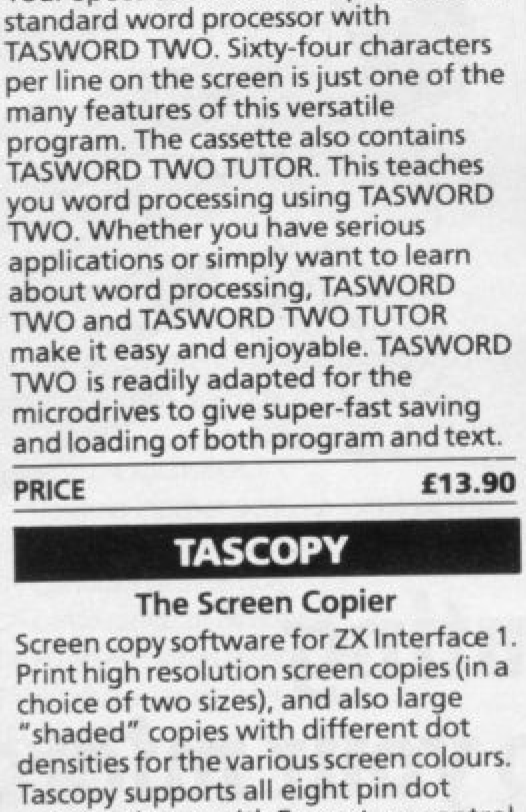
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VISA

Journey to the centre of the ROM

Andrew Hewson delves into the heart of the Z80 to unearth some useful routines.



SINCLAIR Research have manufactured three machines all based on the Z80 microprocessor: the ZX-80, the ZX-81 and the ZX Spectrum, and it is interesting to observe the development from one machine to the next.

A consequence of that understandable policy of developing one ROM from its predecessors is that some features which were necessary or desirable in the earlier version may be retained in the later version because the relevant code is known to work even though they impose constraints on the new design. This is, indirectly, the answer to the following question from John Blackwood of Wakefield who asks **"Why is 9999 the largest line number permitted on the ZX-81?"**

Table 1. This shows the meaning of the top three bits in the first byte of a program line or Basic variable in the ZX-81 and the Spectrum.

Bit pattern	Interpretation
000	Line number less than 8192
001	Line number between 8192 and 9999
010	String
011	Number with single character name
100	Array of numbers
101	Number with multiple character name
110	Character array
111	Control variable for a FOR-NEXT loop

At first sight the limitation to 9999 seems quite illogical because 9999 is not a 'round number' as far as the Z80 microprocessor is concerned. A more logical upper limit might be 255 because that is the maximum integer which the machine can store in a single memory location — or byte. However, many users could be expected to write programs containing more than 255 lines and so a greater limit is desirable. The next highest 'round number' is 65535 which is the largest integer which the computer can store in two consecutive bytes. So why limit line numbers to 9999 when 65535 could be used just as easily?

The reason appears to be that by limiting line numbers in that way and by manipulating the numeric codes for variables the ZX-81 has a device for distinguishing lines in the program area from variables in the variables area.

To understand the mechanism at work, consider the binary representation of 9999. Line numbers are held with their most significant byte first. That is contrary to the usual Z80 convention so we can assume that the manufacturers had some special motive in choosing that arrangement. Hence line number 9999 is held as a byte containing 39 followed by a byte containing 15 because

39 * 256 + 15 = 9999

The bit pattern of the byte, obtained by converting 39 to binary, is 00100111. Notice that the three most significant bits — bit numbers 7, 6 and 5 are set to 0, 0 and 1 for this, the largest permitted line number. Hence bit numbers 7, 6 and 5 of the first byte of all permitted line numbers will be set to 0, 0 and 1, or in the case of line numbers less than 8192, they will be set to 0, 0, 0.

Now look at pages 172 to 174 of the *ZX-81 Basic Programming* manual and you will see illustrations of the different types of variables as they are represented in the variables area. In each case the first byte contains a numeric code related to the code of the letter which identifies the variable — or the code of the first letter of the variable name in the case of a number whose name is longer than one letter. The largest possible letter code is 63, the code for Z, which is still 00111111 in binary, and the smallest is 38, the code for A, which is 00100110 in binary.

Hence bits 7 and 6 are not needed when distinguishing between letter codes and as bit 5 is always set to one, the ZX-81 can use these bits to distinguish between the different types of variable. Three bits can be set in

2 * 2 * 2 = 8

different ways. Table 1 lists the eight ways and their interpretation.

It is strange that Sinclair should take such elaborate precautions to distinguish a line number from a variable because the same purpose could be served by comparing the address of the byte in question to the D-FILE or VARS system variables. It allows the ZX-81 to use the same routine, at 2546 to 2576, to step through memory to the 'next' line or the 'next' variable but that seems a small advantage.

It is certainly one of the

continued on page 214

Table 2. A Spectrum program to PRINT the characters with codes in the range 32 to 255 inculsive. Note that when the a register contains 255, the effect of the inc a instruction is the same as subtracting 255, ie a subsequently contains zero.

Decimal	Assembly Code		Comment
62 32		ld a, 32	Load the a register with 32
245	Again	push af	Save a on the stack
215		rst 16	PRINT the character
241		pop af	Retrieve a from the stack
60		inc a	Increment the a register
32 250		jr nz , Again	Jump to PRINT next character
201		ret	Return when a reaches zero

Table 3. A simple decimal loader for POKEing decimal numbers into the Spectrum printer buffer. To halt the program enter STOP (Symbol Shift A).

```
10   FOR I = 23296 TO 23551
20   INPUT J
30   POKE I , J
40   PRINT I , J
50   NEXT I
```

continued from page 213

Table 4. A Spectrum routine to PRINT the names and types of all the current Basic variables.

Decimal		Assembly Code	Comment
42 75 92		ld hl, (23627)	VARS to hl
126	tend:	ld a, (hl)	128 is the end of VARS marker
254 128		cp 128	
200		ret z	
205 111 91		call setb	Set b register to 1 to 6
205 55 91		call prtvar	Print the name of the variable
205 67 91		call prtdol	Print the dollar sign if necessary
203 64		bit 0,b	Is b even?
40 5		jr z,even	If so jump
205 125 91		call addlen	No, addlen skips over the data
24 22		jr prtres	Skip to prtres
203 80	even:	bit 2,b	b is even. Is it 2?
40 15		jr z, two	If so jump
203 72		bit 1,b	Is b 4?
40 8		jr z, four	If so jump
213		push de	b is 6 so this is a loop counter
17 13 0		ld de, 13	Skip over 13 bytes
25		add hl,de	
209		pop de	
24 3		jr two	
205 141 91	four:	call lonvar	This is a long variable
205 134 91	two:	call addsix	Skip over remaining six bytes
205 77 91	prtres:	call prtype	Print type of variable
62 13		ld a,13	Output the enter character
215		rst 16	
24 204		jr tend	
197	prtvar:	push bc	This routine decodes and prints the
198 32		add 32	(first letter of the) variable held
16 3	tryb:	djnz decb	in the a register
215		rest 16	
193		pop bc	
201		ret	
214 32	decb:	sub 32	
24 247		jr tryb	
203 64	prtdol:	bit 0,b	This routine prints a dollar sign
200		ret z	if b contains 1 or 5
203 72		bit 1,b	
192		ret nz	
62 36		ld a,36	
215		rst 16	
201	ret		
229	prtype:	push hl	This routine prints the appropriate
197		push bc	variable type taken from the table
33 168 91		ld hl,table	controlled by the value in b
16 7	dec:	djnz nexlet	
229		push hl	
205 95 10		call 0a5fh	Tab to column 16
225		pop hl	
24 8		jr out	
126	nexlet:	ld a, (hl)	Decrement b if the next letter has
35		inc hl	code 128
254 128		cp 128	
40 241		jr z,dec	When b is zero the correct entry
24 248		jr nexlet	has been found
126	out:	ld a, (hl)	Print each letter in turn, first
254 128		cp 128	checking for the 128 terminator
40 4		jr z,endpr	
215		rst 16	
35		inc hl	
24 247		jr out	
193	endpr:	pop bc	Restore bc
225		pop hl	and hl
201		ret	before returning
6 1	setb:	ld, b,1	This routine sets the value of b in
14 91		ld c,91	range 1 to 6 according to the value
185	nexb:	cp c	in the first byte of the variable name
216		ret c	
4		inc b	
121		ld a,c	
198 32		add 32	
79		ld c,a	
126		ld a,(hl)	
24 246		jr nextb	
213	addlen:	push de	This routine is used to skip over the
35		inc hl	body of the data for numeric arrays,
94		ld e,(hl)	strings and string arrays

Decimal		Assembly Code	Comment
35		inc hl	
86		ld d,(hl)	
35		inc hl	
25		add hl ,de	
209		pop de	
201		ret	
213	addsix:	push de	Used for simple variables and long
17 6 0		ld de,6	variables to skip over the body of
25		add he ,de	the data
209		pop de	
201		ret	
197	lonvar:	push bc	This routine prints up to ten
6 10		ld b,10	characters from a long variable name
35	nexlon:	inc hl	
55		scf	
126		ld a,(hl)	
254 128		cp 128	
48 12		jr nc,endlon	
215		rst 16	
16 246		djnz nexlon	
35	aglon:	inc hl	Discard any remaining characters
55		scf	after the tenth character has been
126		ld a,(hl)	printed
254 128		cp 128	
48 5		jr nc,endl	
24 247		jr aglon	
214 128	endlon:	sub 128	
215		rst 16	
193	endl:	pop bc	
201		ret	
83	table:	defb 83	
116		defb 116	
114		defb 114	
105		defb 105	
110		defb 110	
103		defb 103	
128		defb 128	
83		defb 83	
105		defb 105	
109		defb 109	
112		defb 112	
108		defb 108	
101		defb 101	
32		defb 32	
118		defb 118	
97		defb 97	
114		defb 114	
105		defb 105	
97		defb 97	
98		defb 98	
108		defb 108	
101		defb 101	
128		defb 128	
78		defb 78	
117		defb 117	
109		defb 109	
101		defb 101	
114		defb 114	
105		defb 105	
99		defb 99	
32		defb 32	
97		defb 97	
114		defb 114	
114		defb 114	
97		defb 97	
121		defb 121	
128		defb 128	
76		defb 76	
111		defb 111	
110		defb 110	
103		defb 103	
32		defb 32	
110		defb 110	
117		defb 117	
109		defb 109	
101		defb 101	
114		defb 114	
105		defb 105	

features which has been carried forward from the ZX-80 to the ZX-81 and then to the Spectrum.

We shall return to discussing Basic variables later but first a small but relevant digression is prompted by the following question from Patrick Higham of Manchester. He asks: **"Is there a simple method of printing characters on the Spectrum screen from a machine code routine?"**

Printing from machine code is very straightforward because the manufacturers have thoughtfully provided a routine in ROM to do all the hard work. The routine is called at address 16 decimal — 10 in hexadecimal — and should be accessed using the special Z80 machine code instruction

RST 16

That instruction, for some reason which has never been adequately explained, is called a 'restart' — hence the RST abbreviation — and is one of eight such special instructions. As far as the user is concerned it has the same effect as a CALL instruction except that only one byte instead of three is required to hold it.

The routine is entered with the A register set to the code of the character to be PRINTed and the appropriate character appears on the screen at the current PRINT position. All registers are preserved by the routine except the AF register pair and so in some circumstances it may be necessary to PUSH and POP AF before and after the RST instruction respectively.

The routine listed in table 2 demonstrates the use of RST 16 by using it to PRINT all characters with codes lying between 32 and 255 inclusive. Note that includes all the tokens so the routine demonstrates that command words like POKE, READ and DRAW can be PRINTed using RST 16 if required. The decimal codes for the routine can be loaded into the printer buffer using the decimal loader listed in table 3.

The RST 16 facility can also be used to control the screen format and layout character codes but a little care must be taken not to follow the INK, PAPER and other control codes by invalid numbers because otherwise error code K results. Some of those layout characters are extremely useful, for example

```
LD A , 13
RST 16
```

will PRINT an 'ENTER' character so that the current PRINT position will move to the start of the next line.

Of course, the PRINT routine at address 16 was not provided by the manufacturers solely for the benefit of users of the finished machine. The Spectrum ROM itself makes extensive use of the facility and so it is littered with RST 16 instructions. That goes some way to explaining the power of RST instructions. Every time one is used two bytes of memory are saved — the difference between the length of a CALL and a RST instruction — and more importantly the Z80 does not waste time calculating the address which is being called because it is implicit in the instruction. Hence RST is very useful for calling routines which are used frequently.

The call to RST 16 is an important part of the routine which is listed in table 4 in response to the following letter from Alan Procter of Windsor: **"Have you a routine to identify the variables existing in memory, identifying them as numerics, string simple or array?"**

The routine is rather longer than the ones I usually include in this column and so I recommend that an assembler program is used to load it into memory. Please note that the routine is not relocatable ie if the decimal codes are used it can only be loaded into the printer buffer starting at 23296.

The routine contains six subroutines which I have called setb, prtvar, prtdol, addlen, lonvar, addsix and prtype. Those perform the following functions:

setb There are six different types of Basic variables and this subroutine looks at the first byte of the current variable and puts the corresponding value into the b register. Table 5 shows the types and the value of b.

prtvar Each type of Basic variable except one has a single character name. This subroutine decodes the character code by successively subtracting 32 and PRINTs the result.

prtdol If the current variable is a string or a string array, this subroutine PRINTs a dollar sign to follow the single character name.

addlen The two bytes following the single byte name of strings, string arrays and character arrays contain a number equal to the number of byte used to store all the data in the variable. This routine adds this number to the pointer in hl so that the next variable can be found.

lonvar This routine PRINTs up to ten characters of the name of a numeric variable with a multiple character name and moves the hl pointer to the end of the variable name.

addsix Six bytes are used to hold the data in numeric variables. This subroutine adds six to the hl pointer so that the next variable can be found.

prtype This subroutine TABs to column 16 using the ROM routine at OA5Fh and then PRINTs the appropriate variable type as determined from the value in the b register from the list of types held in the 'table' at the end of the routine.

Table 5. The codes placed in the b register by the "setb" routine in table 4 and the corresponding variable types.

b register	Type of variable
1	String of characters
2	Simple numeric variable
3	Numeric array
4	Numeric variable with multiple character name
5	String array
6	Loop counter

Table 4 continued

Decimal	Assembly Code	Comment
99	defb 99	
128	defb 128	
83	defb 83	
116	defb 116	
114	defb 114	
105	defb 105	
110	defb 110	
103	defb 103	
32	defb 32	
97	defb 97	
114	defb 114	
114	defb 114	
97	defb 97	
121	defb 121	
128	defb 128	
76	defb 76	
111	defb 111	
111	defb 111	
112	defb 112	
32	defb 32	
99	defb 99	
111	defb 111	
117	defb 117	
110	defb 110	
116	defb 116	
101	defb 101	
114	defb 114	
128	defb 128	

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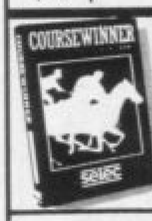
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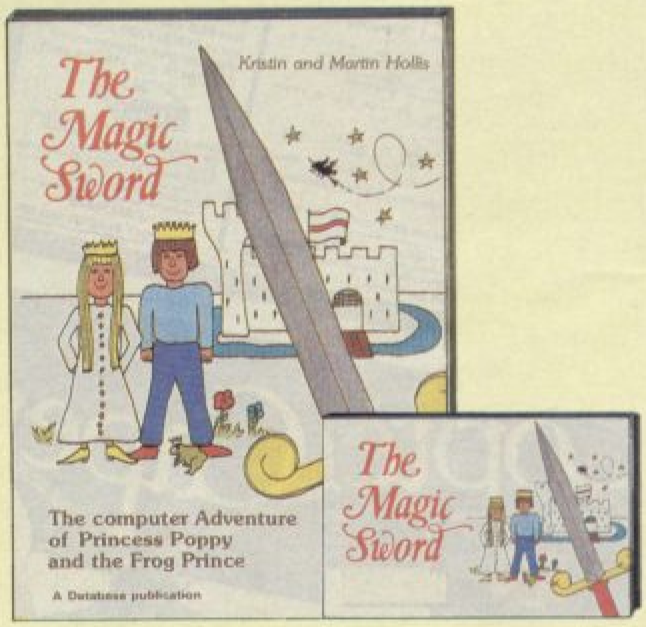


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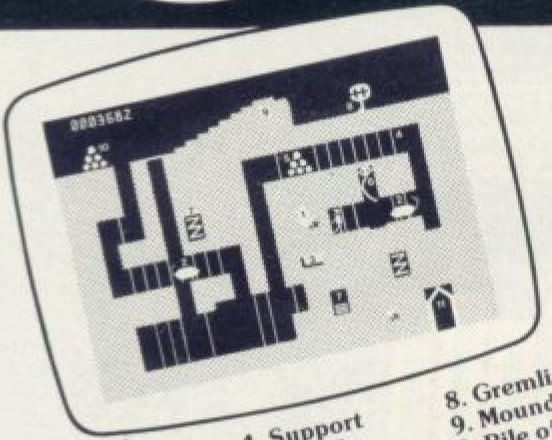
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8. Gremlin
9. Mound
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11. Cave

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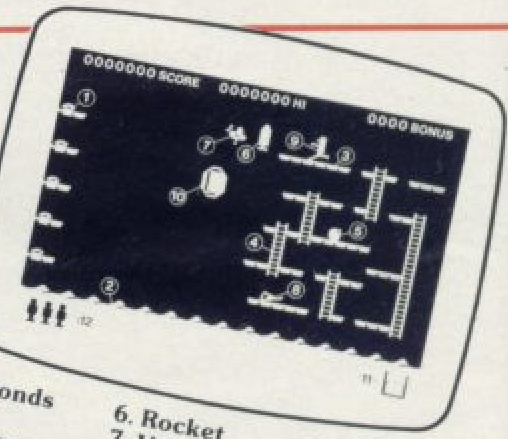
Get rich quick by collecting Diamonds that are simply lying there waiting for you!

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1. Diamonds
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3. Platforms
4. Ladders
5. Fuel Cans
6. Rocket
7. Vulture
8. Leg of Lamb
9. Player
10. Bubloid
11. Fuel Gauge
12. Men remaining

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ZX-81

Adventure

Adventure	Bug-Byte	6
Adventure 1	Abersoft	6
Black Crystal	Mastervision	7
Dungeons of Doom	Woosoft	*
Espionage Island	Artic	*
Greedy Gulch	Phipps	7
Inca Curse	Sinclair	*
Knight's Quest	Phipps	*
Lost Island	JRS	*
Magic Mountain	Phipps	*
Merchant of Venus	Crystal	7
Pharoah's Tomb	Phipps	*
Pimania	Automata	6
Secret Valley	New soft	*
Serpents Tomb	Vortex	*
Ship of Doom	Artic	7
The Great Western	New Soft	*
Time Bandits	New Soft	*
Tomb of Dracula	Felix	*
Trader Trilogy	Quicksilva	6
Volcanic Dungeon	Mastervision	5
World of Illusions	Contrast	4

Arcade

Alien Dropout	Silversoft	*
Asteroids	Silversoft	8
Asteroids	Software Farm	6
Astral Convoy	Vortex	*
Bank Robber	Romik	6
Bears in the Wood	Unicorn	6
Bubble Bugs	Romik	6
Byter	Protek	*
Cassette 1	Orwin	7
Cassette 2-5	Orwin	7
City Patrol	Sinclair	7
Damper	Quicksilva	7
Defenda	Quicksilva	8
Door Slammer	Cathedral	7
Forty-Niner	Software Farm	9
Froggy	DJL	7
Full-screen Breakout	New Generation	*
Galactic Trooper	Romik	6
Galaxians	Quicksilva	6
Galaxy Jailbreak	Romik	6
Games 2	JRS	*
Games Tape 1	J K Greye	*
Games Tape 2	J K Greye	*
Games Tape 3	J K Greye	*
Gamestape 1	Fawkes Computing	7
Glooper	Quicksilva	7
Gloops	Quicksilva	5
Gobbleman	Artic	*
Gobbler	Software Farm	*
Grand Prix	dk'tronics	*
Gulp 2	Campbell	*
Hang Glider	S Electronics	6
Hickstead	CCS	5
High-resolution Invaders	Odyssey	*
Invaders	Abersoft	*
Invaders	Bug-Byte	5
Invaders	Odyssey	8
Invaders	Selec	7
Invaders	Silversoft	*
Krazy Kong	PSS	*
M. Mouse goes de-bugging	Lothlorien	7
Maze Death Race	PSS	*
Maze Man	Abersoft	*
Mazogs	Bug-Byte	8
Micro Mouse	Lothlorien	7
Namtir Raiders	Artic	8
Night Gunner	Digital Integration	5
Puckman	Hewson	*
Rocket Man	Software Farm	7
Sabotage	Sinclair	6
Six Games	A Stubbs	5
Space Raiders	Sinclair	*
Space Rescue	D. Pinch	7
Space Trek	JRS	*
3D Monster Maze	New Generation	9
Three Games Cassette	McGraw Hill	8
Zuckman	DJL	8
ZX Invasion Force	Artic	*
ZX Panic	Selec	4
ZX-81 1K Games Pack	Crystal	9
ZX-81 Pocket Book	Phipps	*

Business

Accounts (Limited company)	Hestacrest	*
Accounts (Sole Trader)	Hestacrest	*
Business Bank Account	Transform	*
Critical Path Analysis	Hilderbay	6
Draft	Myrmidon	*
Mailing List	Hestacrest	*
Payroll	Hilderbay	*
Payroll	Soft Tech	*
Payroll	Soft Tech	*
Payroll	V&H Computing	*
Personal Banking System	Hilton	*
Purchase Ledger	Hestacrest	*
Sales Day Book	Transform	*
Sales Ledger	Hestacrest	*
Text	Contrast	8

Education

Calpac 1-2	Calpac	*
Four Rules of Number	Micro Master	*
Integration	University	8
Intermediate English 1-2	Rose	*
Intermediate Maths 1-2	Rose	*
Language Devel. Series	Glasson	*
Language Devel. Series	Micro Master	*
Linear Programming	University	*
Matrix Operations	University	7
O Level Chemistry	Calpac	*
O Level French Revision	Rose	*
O Level Maths Revision	Rose	*
Polynomials	University	*
Primary Arithmetic	Rose	*
Regression	University	*
Self-teach Program	Anvil	*

Language

Forth	Sinclair	7
ZX Forth	Artic	8

Practical

Ephemeris	Bridge	7
Football Pools	Hartland	*
Poolster	Naigram	3

Puzzle

Nowotnik Puzzle	Phipps	*
Word Fit	Ram Writer	6

Simulation

Flight Simulation	Sinclair	6
Pilot	Hewson	7
Print Shop	CCS	*

Strategy

Airline	CCS	7
Auto Chef	CCS	7
Battleships	JRS	*
Conflict	Martech	7
Cyborg Wars	Stratagem	7
Dallas	CCS	6
Dictator	Bug-Byte	7
Farmer	CCS	*
Fighter Pilot	Digital Integration	5
Football Manager	Addictive Games	7
Fort Apache	Contrast	8
Galaxy Conflict	Martech	8
Great Britain Ltd	Hessel	*
Ocean Trader	Quicksilva	7
Pioneer Trail	Quicksilva	7
Racehorse Trainer	G Barker	6
Racing League	Racing League Software	4
Lynchmob	Bridge	6
Original Superchess	CP Software	*
Tai	PSS	*
Tenpin	Phipps	*
ZX 1K Chess	Artic	*
ZX Compendium	Mastervision	7
ZX-Chess I	Artic	*

Traditional

Do Not Pass Go	Work Force	*

Utility

Graphics	IPA	*
Graphics Toolkit	JRS	9
HI Resolution	CRL	6
Machine Code Test Tool	OCP	*
MCoder	PSS	8
Programme Enhancement Package	R and R	*
Renumber Delete	Work Force	*
Trace	Texgate	7
ZX Compiler	Silversoft	*
ZX Screenkit	Picturesque	*
ZX-81 Remload	Picturesque	*
ZX-Bug	Artic	*
ZX-sideprint	Microsphere	*
ZXAS	Bug-Byte	*
ZXDB	Bug-Byte	*

SPECTRUM 16K

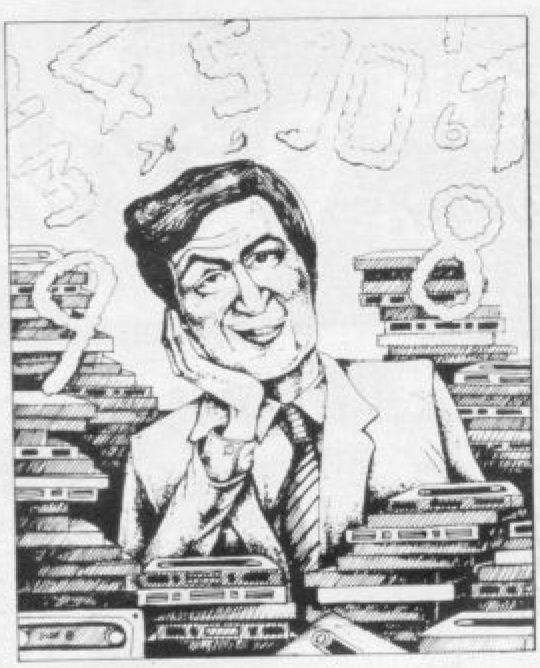
Adventure

Android One	Vortex	*
Escape	New Generation	8
Mines of Saturn/Return to Earth	Mikro-Gen	*
Moria	Severn	*
Planet of Death	Artic	6
Secret Valley	New Soft	*
The Great Western	New Soft	*
Time Bandits	New Soft	*

Arcade

Aquarius	Bug-Byte	6
Arcadia	Beau Jolly	5
Arcadian	J K Greye	6
Assassin	Spectrasoft	*
Avenger	Abacus	5
Baron	Temptation	*
Base Invaders	Imagination	*
Black Hole	Quest	6
Blind Alley	Sunshine	7
Bug Blaster	Crystal	*
Cassette A	Orwin	*
Caterpillar	CDS	*
Cavern Fighter	Bug-Byte	4
Centi-Bug	dk'tronics	*
Children's Compendium	Dymond	*
City Defence	Mikro-Gen	*
Colour Clash	Romik	4
Cookie	Ultimate	*
Cosmic Guerilla	Crystal	8
Crazy Cranes	Voyager	5
Creepy Crawler	Mikro-Gen	*
Crevasse and Hotfoot	Microsphere	7
Cruising	Sunshine	4
Cyber Rats	Silversoft	7
Death Chase	Micromega	6
Demolition	Comp. Rentals	*
Destroyer	Winters	*
Di-lithium Lift	Hewson	3
Digger Dan	Ocean	*
Doombugs	Work Force	8
Dymonoids	Dymond	*
Earth Defence	Artic	5
Ed-On	Add-On	4
Eskimo Eddie	Ocean	*
Family Games Pack	Hornby	*
Fireflash	Abacus	5
Froggy	DJL	7
Fruit Machine	dk'tronics	6
Galactians	dk'tronics	*
Galactic Trooper	Romik	3
Galactic Warriors	Abacus	6
Galaxians	Artic	6
Ghost Hunt	PSS	*
Gnasher	Mastertronic	4
Gobble-a-Ghost	CDS	*
Gobbleman	Artic	*
Godzilla and Martians	Temptation	7
Ground Attack	Silversoft	6

continued on page 222



Gulpman	Campbell	*
Haunted Hedges	Micromega	6
Hopper	PSS	6
Horace and the Spiders	Sinclair	8
Horace Goes Skiing	Sinclair	8
Hungry Horace	Sinclair	8
Invasion Force	Artic	8
It's the Wooluf	Crystal	5
Jet Pac	Ultimate	8
Labyrinth	Axis	4
Leap Frog	CDS	*
Light Cycle	PSS	*
Luna Crabs	Micromega	7
Magic Meanies	CDS	2
Maze Chase	Hewson	8
Meteor Storm	Quicksilva	7
Meteoroids	dk'tronics	7
Meteoroids	Softek	6
Micro Mouse	Lothlorien	6
Millypede	Add-on	7
Mined Out	Quicksilva	7
Moon Buggy	Visions	6
Mr Wong's Loopy Laundry	Artic	6
Muncher	Silversoft	*
Muncher	Silversoft	6
Nanas	Mikro-Gen	*
Orbiter	Silversoft	7
Ostron	Softek	*
Pengy	Micromania	4
Pitman Seven	Visions	*
Planetoids	Sinclair	8
Proteus	Abacus	5
Rapedes	Visions	*
Repulsar	Softek	*
Rider	Virgin	6
Road Toad	dk'tronics	7
Robot Panic	Soft Mill	1
Sam Spade	Silversoft	5
Santa	Artic	*
Sentinel	Abacus	7
Shark Attack	Romik	5
Sheer Panic	Visions	7
Slippery Sid	Silversoft	8
Space Fighter	Winters	*
Space Intruders	Quicksilva	7
Space Lanes	Cathedral	*
Space Raiders	Sinclair	6
Space Zombies	Mikro-Gen	*
Spec. Frogs/ Showdown	Artic	*
Spec. Gobbleman	Artic	*
Spec. Invaders	Artic	*
Spec. Invasion Force	Artic	*
Spec. Scramble	Work Force	7
Spectipede	Mastertronic	5
Spectral Invaders	Bug-Byte	8
Spectral Panic	Hewson	5
Spectres	Bug-Byte	6
Strike Four	Spectresoft	4
Styx	Bug-Byte	7
Sub	Romik	*
Tank Battle	dk'tronics	8
3D Monster Chase	Romik	3
Train Game	Microsphere	9
Trom	dk'tronics	4
Vortex	JK Greye	5
Winged Warlord	CDS	6
Wizard's Warriors	Abersoft	*
Yomp	Virgin	7

Business

Finance Manager	OCP	9
Home Computer Pack	SD Micro	*
Masterfile 16	Campbell	*
Matcalc	Work Force	*
Micropen	Contrast	*
Vu-Calc	Sinclair	7
Vu-File	Sinclair	8

Education

Alphabet	Widget	*
Alphabet Games	Sinclair	*
Apostrophe	Sinclair	7
Ballooning	Heinemann	*
Calpac 1-3	Calpac	*
Car Journey	Heinemann	*
Cargo	Sinclair	*
Chess Tutor	Artic	7
Counting	Starter Soft	*
Counting	Widget	*
Education One	Lerm	*
Educational	Startersoft	*
Firework Music	Soft Cottage	8
First Numbers	Collins	*
40 Education Games	Granada	*
Four Rules of Number	Micro Master	*
French Voc Test	Tutorial	*
Hidden Letters	Poppy	*
Hot Dot Spotter	Longman	*
Integration	University	8
Intermediate English 1-2	Rose	*
Intermediate Maths 1-2	Rose	*
Know Your Tables	Collins	*
Language Devel. Series	Glasson	*
Language Devel. Series	Micro Master	*
Learn Basic	Logic 3	*
Learning Read 1	Poppy	*
Linear Programming	University	*
Marks Book	Lerm	*
Maths Invaders	Stell	*
Maths Tutor	AD Software	*
Matrix Operations	University	7
Money	Poppy	*
Night Sky	Bridge	*
O Level Maths	Homestudy	*
O Level Physics	Homestudy	*
Paddington's Shopping Mix-up	Collins	*
Pathfinder	Widget	*
Polynomials	University	8
Pre/early school cassettes	Essex	*
Primary Arithmetic	Rose	*
Punctuation Pete	Heinemann	*
Regression	University	8
Self-teach Program	Anvil	*
Shape Sorter	Widget	*
Special Agent	Heinemann	*
Spellbin	Startersoft	*
Use and Learn	Microl	8

Language

Beta Basic	Betasoft	9

Practical

Biorythms	Spectrasoft	*
Countries of the World	Hewson	8
Cycle Planner	Medidata	4
Map of the UK	Kuma	7
Shopping List	SD	*
Spectasort	Spectadraw	4

Puzzle

Flippit	Sinclair	7
Hanoi King	Contrast	7
Lojix	Virgin	3
Nowotnik Puzzle	Phipps	7
Quazar	Rose	4

Simulation

Air Traffic Controller	Hewson	6
Airliner	Protek	6
Golf	R & R	7
Golf	Virgin	7
Golf	Virgin	8
NightFlite	Hewson	5
Print Shop	CCS	8
Pro-Golf	Hornby	7

Strategy

Auto Chef	CCS	*
Big Match Soccer	Winters	*
Dallas	CCS	6
Dictator	dk'tronics	*
Farmer	CCS	*
Football	Winters	*
Heathrow	Hewson	8
Las Vegas	Temptation	*
Quincy	Severn	*

Traditional

Backgammon	Hewson	*
Bridge Tutor	CP Software	8
Bridgemaster	Bridgemaster	9
Challenge	Temptation	*
Gambling Tape	Dymond	*
Las Vegas	Temptation	5
Odds-on	RSD	*
Othello	CP Software	*
Pinball	Winters	*
Pool	Bug-Byte	7
Reversi	Sinclair	8
Roulette	Newsoft	*
Solo Whist	Video Soft.	*
Spec. Microchess	Artic	*
Super Play 1	Video	*
Tennis	Winters	*

Utility

Aspect	Bug-Byte	5
Audio Sonics	Work Force	4
Auto Sonics	Buttercraft	5
Basic Utilities	Jaysoft	6
Character Generator	Spectrasoft	*
Dietron	Custom	6
Disassembler	dk'tronics	7
Display	Work Force	*
Editor/Assembler	Picturesque	8
Extended Basic	CP Software	7
FP Compiler	Softek	9
Friendly Face	Monitor	7
Keysounder	S and G	*
Letterfont	Allanson	8
Machine Code Test Tool	OCP	7
Master Toolkit	OCP	7
MCoder	PSS	8
Micropen	Contrast	*
Print Utilities	Sinclair	7
Programmer's Dream	Work Force	8
Renumber Delete	Work Force	*
Slow Loader	ELR	9
Sound FX	dk'tronics	6
Spec. Bug	Artic	*
Spec. Editor/ Assembler	Picturesque	8
Spec. Monitor	Picturesque	7
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SPECTRUM 48K

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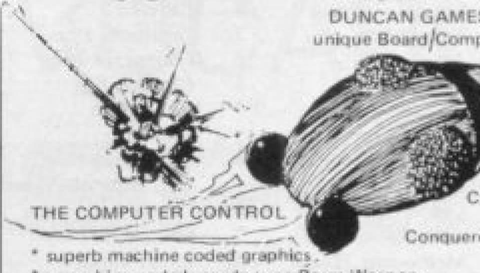
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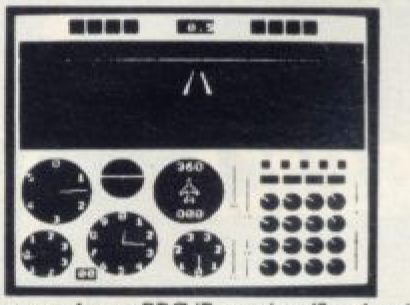
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Trans Express	Romantic Robot	8
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Zeus Assembler	Sinclair	9

QL

Assembler Dev. Package	Metacomco	9

Software Publishers

A & F Software, Unit 8, Canalside Industrial Estate, Woodbine Street East, Rochdale, Lancashire OL16 5LB
Abacus Software, 21 Union Street, Ramsbottom, Nr Bury, Lancashire
Abbex, 20 Ashley Close, Manor Hall Drive, London NW4
Abersoft, 7 Maesfallen, Bow Street, Aberystwyth, Wales
Add-on Electronics, Units 2,3 & 4, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ
Addictive Games, 7a Richmond Hill, Bournemouth BH2 6HE
ADS, 8 Bronchurch Street, Portsmouth, Hampshire PO4 8RY
Allanson Computing, 77 Chorley Road, Adlington, Chorley, Lancashire PR6 9LH
Alligata Software, 1 Orange Street, Sheffield S1 4DW
APS, 1 Golden Square, London W1
Arcade Software, Technology House, 32 Chislehurst Road, Orpington, Kent BR6 0DG
Arnold Wheaton, Parkside Lane, Dewsbury Road, Leeds LS11 5TD
Artic Computing, Main Street, Brandesburton, Driffield YO25 8RG
Automata UK, 27 Highland Road, Portsmouth, Hampshire P04 9DA
Axis, 71 Brookfield Avenue, Loughborough, Leicestershire LE11 3LN
Beau-Jolly, 19A New Broadway, Ealing, London W5
Bellflower Software, 6 Rosewood Avenue, Greenford, Middlesex UB6 7QP
Betasoft, 92 Oxford Road, Moseley, Birmingham B13 9SQ
Beyond Software, 8 Herbal Hill, London EC1
Bridge Software, 36 Fernwood, Marple Bridge, Stockport, Cheshire SK6 5BE
Bridgemaster, Sandymouth, Beeches Road, Farnham Common, Buckinghamshire SL2 3PS
Buffer Micro, 310 Streatham High Road, London SW16
Bug-Byte, Mulberry House, Canning Place, Liverpool L1 8JB
Calpac Computer Software, 108 Hermitage Woods Crescent, St Johns, Woking, Surrey
Campbell Systems, 57 Trap's Hill, Loughton, Essex IG10 1TD
CCS, 14 Langton Way, Blackheath, London SE3 7TL
CDS Micro Systems, Silver House, Silver Street, Doncaster, South Yorkshire DN1 1HL
Chalksoft, 37 Willowslea Road, Northwick, Worcester
Cheetahsoft, 24 Ray Street, London EC1R 3DJ
Clever Clogs, Argus Press Software Group, 1 Golden Square, London W1R 3AB
Collins, 18/20 Stephenson Way, North Gower Street, London NW1 2DX
Computatutor, 3 Thalia Close, Greenwich, London SE10 9NA
Contrast Software, Warren Road, Liss, Hampshire GU33 7DD
Cornhill Software, 2 Penrith Way, Aylesbury, Buckinghamshire HP21 7JZ
CP Software, 1 Glebe Road, Uxbridge, Middlesex UB8 2RD
Creative Sparks, Thomson House, 296 Farnborough Road, Farnborough, Hampshire
Cross Software, 36 Langford Crescent, Barnet, Hertfordshire EN4 9EH
Crystal Computing, 2 Ashton Way, East Herrington, Sunderland SR3 3RX
Digital Integration, Watchmoor Trade Centre, Watchmoor Road, Camberley, Surrey GU15 3AJ
dk'tronics, Unit 6, Shire Hill Ind Est, Saffron Walden, Essex CB11 3A
Doric Computer Services, 3 The Oasis, Glenfield, Leicester LE3 8QS
Durrell Software, Castle Lodge, Castle Green, Taunton TA1 4AB
Dymond Software, 22 Hospital Road, Annan, Dumfriesshire DG12 5HP
East London Robotics, St Nicholas House, The Mount, Guildford, Surrey GU2 5HN
Eastmead, Eastmead House, Lion Way, Camberley, Surrey GU16 5EZ
Ebury Press, Humphrey Bull & Barker, 62 Dean Street, London W1V 5HG
Elm Computers, 59 Bateman Road, East Leake, Loughborough, Leicestershire LE12 6NN
Fantasy Software, Fauconberg Lodge, 27a St Georges Road, Cheltenham
Fawkes Computing, 41 Wolfridge Ride, Alveston, Bristol BS12 2RA
Felix Software, 19 Leighton Avenue, Pinner HA5 3BW
Fulwood, 20 Templestowe Hill, Whitkirk, Leeds LS15 7EJ
Gargoyle Games, 4 North Western Arcade, Birmingham BS 5LH
Gemini Software, 18a Littleham Road, Exmouth, Devon EX8 2QG
Gemtime Software Division, 16 Ben Ledi Road, Kirkcaldy, Fife KY2 5RP
Gilsoft, 30 Hawthorn Road, Barry, South Glamorgan, South Wales
Gouldstone, 45 Burleigh Avenue, Wallington, Surrey SM6 7UG
Granada Publishing, 8 Grafton Street, London W1X 3LA
Griffin & George, Frederick Street, Birmingham B1 3HT
Harlequin Software, 43 Osprey Park, Thornbury, Bristol BS12 1LY
Hartland Software, 32 Ivor Place, London NW1 6DA
Heath Computing, 7 The Meadows, Flackwell Heath, Buckinghamshire HP10 9LX
Hessel, 15 Lythan Court, Cadwell Crescent, Sunningdale, Berkshire
Hestacrest, PO Box 19, Leighton Buzzard, Bedfordshire LU7 0DG
Hewson Consultants, 56B Milton Trading Estate, Milton, Abingdon
Hilderbay, 8/10 Parkway, Regents Park, London NW1 7AA
Hilton Computer Services, 14 Avalon Road, Orpington, Kent
Hisoft, 180 High Street, Dunstable, Bedfordshire LU6 1AT
Homestudy Ltd, Treleigh Woods Farm, Treleigh, Redruth, Cornwall TR16 4AW
Hornby Software, 21 Penfold Hill, Leeds LS15 0PW
Image Systems, 34 Lynwood Drive, Worcester Park, Surrey KT4 7AB
Incentive, 54 London Street, Reading, Berkshire RG1 4SQ
Inform Software, 3 Treesdale Close, Birkdale, Southport PR8 2EL
Interstella Software, 82 New Forest Drive, Brockenhurst, Kent
ISP Marketing Ltd, Crown Hill, 38B High Street, Godalming, Surrey GU7 1DZ
JK Greye Software, 16 Park Street, Bath, Avon BA1 2TE
JRS Software, 19 Wayside Avenue, Worthing, Sussex BN13 3JH
K-Tel International (UK), 60 Western Avenue, London W3 0TU
Kemp, 43 Muswell Hill, London N10 3PN
Keysoft, 6 Bruce Grove, Tottenham, London N17
Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Bedfordshire LU5 6LX
Kuma Computers, 12 Horseshoe Park, Pangbourne, Berkshire RG8 7JW
Legend, PO Box 435, London E4 7LX
Lerm, 10 Brunswick Gardens, Corby, Northamptonshire
Level Nine, 229 Hugenden Road, High Wycombe, Buckinghamshire HP13 5PG
Logic 3, Unit 18, Wye Ind Est, London Road, High Wycombe, Buckinghamshire
Longman, Longman Group, Longman House, Harlow, Essex CM20 2JE
Lothlorien, 56a Park Lane, Poynton, Stockport, Cheshire SK12 1RE
Manor Software, 24 Manor Gardens, London SW20
Martech Games, 9 Billingburgh Road, Eastbourne, East Sussex BN20 8LY
Mastertronic, (as for Mastervision)
Mastervision, Park Lorne, 111 Park Road, London NW8 7SL
McAlley, 1 Cowleaze, Chinnor, Oxfordshire OX9 4TD
McGraw Hill, Shoppen Hangers Road, Maidenhead, Berkshire
Medidata, PO Box 26, London NW9 9BW
Melbourne House, Castle Yard House, Castle Yard, Richmond TW10 6TF
Micro Dealer UK, Unit 6, Marlborough Road Trading Estate, Lattimore Road, St Albans, Hertfordshire
Microbyte, 19 Worcester Close, Lichfield, Staffordshire
Microcosm, 68 The Glade, Clayhall, Ilford
Micromania, 14 Lower Hill Road, Epsom, Surrey KT19 8LT
Micromega, 230/236 Lavender Hill, London SW11
Microsphere, 72 Roseberry Road, London N10 2LA
Mikro-Gen, 44 The Broadway, Bracknell, Berkshire RG12 1AG
Minatron Computing, 34 Pinewood Close, Westbury on Trym, Bristol BS9 4AJ
Mirrorsoft, PO Box 50, Bromley, Kent BR2 9TT
Monitor Software, PO Box 442, London NW7 2JF
Mosaic, 187 Upper Street, London N1 1RQ
MW Gamesworld, 12 Lawnswood Avenue, Chasetown, Walsall WS7 8YD
Myrmidon Software, PO Box 2, Tadworth, Surrey KT20 7LU
Naigram Software, c/o Soho Synth House, 18A Soho Square, London W1V 5FB
Nectarine, 837 Yeovil Road, Slough SL1 4JH
Newsoft, 12 White Broom Road, Hemel Hempstead, Hertfordshire
NTD Software, 19 Radipole Road, London SW6

Oasis Software, 9a Alexandra Parade, Weston-Super-Mare, Avon BS23 1QT
Ocean Software, 6 Central Street, Manchester M2 5NS
OCP, 4A High Street, Chalfont St Peter, Buckinghamshire SL9 9QB
Orwin Software, 26 Brownlow Road, Willesden, London NW10 9QL
Penguin, 536 King's Road, London SW10
Phipps Associates, 172 Kingston Road, Ewell, Surrey

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Software Directory

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Phoenix Publishing, 14 Vernon Road, Bushey, Hertfordshire WD2 2JL
Picturesque, 6 Corkscrew Hill, West Wickham, Kent BR4 9BB
Poppysoft, The Close, Common Road, Headley, Newbury, Berkshire
Print 'n' Plotter Products, 19 Borough High Street, London SE1 9SE
Protek Computing, 1a Young Square, Brucefield Ind Park, Livingston, West Lothian
PSS, 452 Stoney Stanton Road, Coventry CV6 JDG
Pulsonic, Warwick Distribution Ltd, 3 Standard Road, Park Royal, London NW10 6EX
Quicksilva, Palmerstone Park House, Southampton, Hampshire S01 1LL
R and R, 34 Burton Road, Gloucester GL4 0LE
RAM Writer, 3 Vumba House, 2 Cedar Gardens, Sutton, Surrey
Ramtop Services, 5 Rue D'Artois, 75008, Paris, France
Red Shift, 12c Manor Road, Stoke Newington, London N16 5SA
Romantic Robot, 113 Melrose Avenue, London NW2 4LX
Romik Software, 272 Argyll Avenue, Slough SL1 4HE
Rose Software, 148 Widney Lane, Solihull, West Midlands
Runesoft, Charnwood House, Crossgate Drive, Nottingham NG2 TLW
Salamander Software, 27 Ditchling Rise, Brighton, East Sussex BN1 4QL
Scisoft, 5 Minster Gardens, Newthorpe, Eastwood, Nottingham NG16 2AT
SCR Adventures, 190 Shelbourne Road, Tottenham, London
SD Microsystems, 9 Cadwell Court, Hitchin, Hertfordshire SG4 0AQ
Selec Software, 37 Councillor Lane, Cheadle, Cheshire
Serim Software, Freepost, Dept SU7, PO Box 163, Slough, Berkshire SL2 3YY
Shards, Suite G, Roycraft House, 15 Linton Road, Barking, Essex
Shepherd Software, Elm House, 23-25 Elmshott Lane, Chippenham, Slough, Berkshire
Silversoft, London House, 271/273 King Street, London W6 9LZ
Sinclair Research, 6 Kings Parade, Cambridge
Soft Cottage, 19 Westfield Drive, Loughborough, Leicestershire LE11 3QJ
Soft Tech, 31 Lampits, Hoddesdon, Hertfordshire
Softek International, 12/13 Henrietta Street, Covent Garden, London WC2E 8LH
Softel, 5 Durward Drive, Glenrothes, Fife KY6 2LB
Software Farm, 155 White Ladies Road, Clifton, Bristol BS8 2RG
Software Projects, Bear Brand Complex, Allerton Road, Woolton, Liverpool, Merseyside L25 7SE
Spartan CC, 29 Feltham Avenue, East Moseley, Surrey KT8 9BJ
Spectadraw, 1 Cowleaze, Chinnor, Oxfordshire OX9 4TD
Spectrasoft, Capital House, Market Place, London W3 6AL
Startersoft, 32 Parkfields, Chippenham, Wiltshire
Stell Software, 36 Limefield Avenue, Whalley, Lancashire BB6 9RJ
Stratagem Cybernetics, 286 Corbin Place, 2E, Brooklyn, New York 11235
Sulis Software, 4 Church Street, Abbey Green, Bath BA1 1FP
Sunshine Books, 12/13 Newport Street, London WC2
Sussex Publication, Townsend Poulshot, Devizes, Wiltshire SN10 1SD
Tasman Software, 17 Hartley Crescent, Leeds LS6 2LL
Temptation Software, 27 Cinque Ports Street, Rye, East Sussex
Terminal Software, Derby House, Derby Street, Bury BL9 0NW
Texgate, 14 Brook Lane, Corfe Mullen, Wimbourne, Dorset
Think Tank, 35 Wellington Road, Wimbledon Park, London SW19
Timedata, 16 Hemmells High Road, Laindon, Basildon, Essex SS15 6ED
Transform, 41 Keats House, Porchester Mead, Beckenham, Kent
Tutorial Software, 'Vilands', Glasllwch Lane, Newport, Gwent NP1 3PS
Ultimate Play the Game, The Green, Ashby de la Zouche, Leicestershire LE6 5JU
Unicorn Micro Systems, 312 Charminster Road, Bournemouth BH8 9RT
University Software, 29 St Peters Street, London N1
Vega Space Systems, 28 Watford Road, St Albans AL1 2AJ
Virgin Games, 2-4 Vernon Yard, London W11
Visions, 1 Feldgate Mews, Studlands Street, London W6
Vortex Software, 280 Brooklands Road, Brooklands, Manchester M23 9HD
Widgit Software, 48 Durham Road, London N2 9DT
Wilcox Software, Station Road, Walsall WS7 6JZ
Winters, 24 Swannington Close, Cantley, Doncaster, South Yorkshire
Woosoft, 5 Andrews Close, Robertsbridge, Sussex TN32 5PB
Workforce, 140 Wilsden Avenue, Luton, Bedfordshire
Wyvern Software, 2 Princes Building, George Street, Bath BA1 2ED

Sinclair spares and repairs



IF, LIKE MANY other Spectrum owners, you find one day that your computer has died, you will have a major problem on your hands. Phoning the Sinclair Research customer relations department in Camberley will not help very much either.

If your electronics knowledge is limited, then you will decide to send your Spectrum to one of the companies who specialise in repairing computers. If you have a good working knowledge of electronics then the addresses listed below should enable you to obtain most replacement parts to repair your computer. Some of the simpler repairs, such as those involving keyboards can be undertaken by those with limited knowledge.

If your computer is under guarantee then it is important that you do not invalidate that guarantee. Talk to the customer service division at Sinclair Research and they will tell you where to send it. When returning the computer put a note in describing the fault as briefly as possible, as this will speed the repair process.

Suppliers of Sinclair parts:

Adaptors and Eliminators, 14 Thames Street, Louth, Lincolnshire. (050782) 8011. Spectrum and ZX-81 power supplies.
ASTEC (UK), 16 Albury Close, Reading, Berkshire. (0734) 53067. Supplies modulators for all countries PAL, NTSC, SECAM.
CPC, 194-200 North Road, Preston, Lancashire. (0772) 555034. Supplies all parts for Spectrum, ZX-81, ZX printer, ZX RAM pack including all case parts, power supplies and keyboard parts. Probably the best place to get ULA, ROM, case parts and keyboard.
Ferranti Semiconductors, Computer Road, Hollinwood Avenue, Oldham, Lancashire. (061) 682 6844, (061) 624 0515/6661. Supplies Spectrum and ZX-81 ULA.
Maplin Electronics, Southend on Sea, Essex. (0702) 552961. Supplies general components and data and technical books.
National Semiconductors (UK) Ltd, 301 Harpur Centre, Horne Lane, Bedford. (0234) 47147. Supplies Spectrum RAM/74LS series TTL; LM 1889 video chip.
NEC (UK) Ltd, Block 3, Carfin Industrial Estate, Motherwell. (0698) 73221. Supplies Spectrum ROM and RAM/74LS TTL; Z80A.
Sendale Plastics Ltd, Ramsey Road, St Ives, Cambridge. (0480) 62095. Supplies ZX-81 and Spectrum case parts.
Sinclair Research Ltd, Camberley, Surrey. (0276) 685311.
Texas Instruments, Manton Lane, Bedford, Bedfordshire. (0234) 223000, (0234) 211655. Supplies RAM 4116, 4532, 4164, 74LS TTL (Spectrum).
Timex Corporation, Camperdown Plant, Harrison Road, Dundee, Tayside. (0382) 819211. Makers of Spectrum, ZX-81, Printer, Interface one, Microdrives, RAM Pack. Repair and service for Sinclair.
Verran (Computerfix), Units 2H & 2J, Albany Park, Frimley Road, Camberley, Surrey. (0276) 66266. Repairs Spectrums and ZX-81.
Zilog (UK) Ltd, Zilog House, 45-53 Moorbridge Road, Maidenhead, Berkshire. (0628) 39200. Supplies Z80A.

Component companies

SOME OF THE large companies mentioned above do not like dealing directly with the public. The following is a list of component companies which should be happy to deal with you. Most will have catalogues available and will supply data sheets for their products on demand.

These firms are only distributors and they do not make components. If you have a problem with a particular device contact the manufacturer as listed above because not many of the distributors can answer technical questions; RS Components, Farnell, Ambitt and Hawkes may do. Anyone needing NEC parts should phone them direct and ask for some distributors dealing with them.

Abacus Electronics, Kennet House, Pembroke Road, Reading, Berkshire. (0734) 33311. Makes dealt with: National Semiconductors, SGS.
Access Electronic Components Ltd, Austin House, Bridge Street, Hitchen, Hertfordshire. (0462) 57244. Makes dealt with: National Semiconductors.
Alpha Electronic Components Ltd, 66 Wilbury Way, Hitchin, Hertfordshire. (0462) 57244. Makes dealt with: National Semiconductors.
AM Lock Distribution Ltd, Nevill Street, Middleton Road, Oldham, Lancashire. (061) 652 0431. Makes dealt with: Motorola, Mostek.
Anzac Components Ltd, Burnham Lane, Slough, Buckinghamshire. (06286) 4701. Makes dealt with: Hitachi.
Axion Electronics Ltd, Unit F, Turnpike Road, Cressex Industrial Estate, High Wycombe, Buckinghamshire. (0494) 442181. Makes dealt with: Motorola.
BA Electronics Ltd, Millbrook Road, Yate, Bristol. (0454) 315824. Makes dealt with: Texas Instruments.
Celdis Ltd, 37-39 Loverrock Road, Reading, Berkshire. (0734) 585171. Makes dealt with: Motorola, Mostek.
Crellon Electronics Ltd, 380 Bath Road, Slough, Berkshire. (06286) 4434. Makes dealt with: Motorola, SGS, Zilog.
Dialogue Distribution Ltd, Watchmore Road, Camberley, Surrey. (0276) 682001. Makes dealt with: Hitachi.
DTV Group, 10-12 Earnest Avenue, West Norwood, London SE27. (01) 670 6166. Makes dealt with: National Semiconductors.
Farnell Electronic Components Ltd, Canal Road, Leeds. (0532) 636311. Makes dealt with: Hitachi, National Semiconductors.
Hawke Electronics Ltd, Amotex House, 45 Hanworth Road, Sunbury on Thames, Middlesex. (01) 979 7799. Makes dealt with: Motorola, Texas Instruments. Will answer technical queries.
Hill Electronics (NI) Ltd, 290 Antrim Road, Belfast, Northern Ireland. Makes dealt with: Mostek.
ITT Multicomponents, Edinburgh Way, Harlow, Essex. (0279) 442971. Makes dealt with: Motorola, National Semiconductors, SGS, Texas Instruments and Hitachi.
Macro Marketing Ltd, Burnham Lane, Slough, Berkshire. (06286) 4422. Makes dealt with: Motorola, National Semiconductors, Zilog, Texas Instruments.
Quarndon Electronics Ltd, Slack Lane, Derby. (0332) 32651. Makes dealt with: Texas Instruments.
STC Electronics, Edinburgh Way, Harlow, Essex. (0279) 26777. Makes dealt with: Motorola, National Semiconductors, SGS, Texas Instruments and Hitachi.

Computer parts

Z80A: Zilog, SGS, NEC (Spectrum/ZX-81).
ULA: Ferranti (Spectrum/ZX-81).
ROM: Hitachi, NEC (Spectrum), Mostek, Motorola (ZX-81).
RAM: 4116 type — NEC, National Semiconductors, Texas Instruments, ITT (Spectrum). 4532 type — Texas Instruments, OKI (Manhattan Skyline) (Spectrum). 2114 type — Motorola, NEC (ZX-81). 4118 type — Mostek (ZX-81). 2K type — Mostek, Toshiba, Motorola, Texas Instruments, NEC (ZX-81).
LM1889: ICI4 — National Semiconductors (Spectrum).
TTL: 74LS00/74LS32/74LS157 — Texas Instruments, SGS, Motorola, National Semiconductors, NEC.

The following are all used on the 48K Spectrum.

Regulator: LM7805 +5V Reg. — SGS, NEC, Texas Instruments, Motorola.
Crystals, Capacitors, Resistors, Diodes, Sockets: available through general component suppliers.
Modulator: UM1233 Astec (UK) Ltd.
Leads: available at most TV/electrical shops.
Case parts: Sendale Plastics.
Keyboard: CPC.

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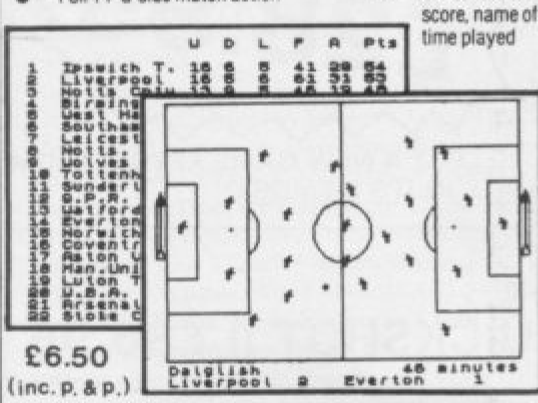
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THOUGHTS & CROSSES

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TELEPHONE 0924–402337.

Program	Publisher	Rec. retail price	Our price
Bugaboo	Q/Silver	6.95	6.25
Aquaplane	Q/Silver	6.95	5.95
3D Ant Attack	Q/Silver	6.95	6.25
The Snowman	Q/Silver	6.95	6.25
Fred	Q/Silver	6.95	6.25
Games Designer	Q/Silver	14.95	13.00
Chess II	Artic	9.95	8.95
Invaders	Artic	4.95	4.50
Golden Apple	Artic	6.95	6.25
Chess Tutor	Artic	6.95	6.25
Galaxians	Artic	4.95	4.50
Mr Wongs Laundry	Artic	6.95	6.25
Snooker	Artic	5.95	5.35
World Cup Soccer	Artic	6.95	6.25
Halls of Things	Crystal	7.50	6.75
Rommels Revenge	Crystal	6.50	5.85
Collectors Pack	Sinclair	6.95	6.25
Horace & Spiders	Psion	5.95	5.35
Vu File	Psion	8.95	8.00
Vu Calc	Psion	8.95	8.00
Vu 3D	Psion	9.95	8.95
Backgammon	Psion	5.95	5.35
Club Record Cont.	ICL	6.95	6.25
Flight Simulation	Psion	7.95	7.15
Small Bus A/C	Sinclair	12.95	11.60
Cyrus 15 Chess	IS	9.95	8.95
Scrabble	Sinclair	15.95	14.35
Chequered Flag	Psion	6.95	6.25
Learn to Read 1	S/McMillan	9.95	8.95
Learn to Read 2	S/McMillan	9.95	8.95
Learn to Read 3	S/McMillan	9.95	8.95
Learn to Read 4	S/McMillan	9.95	8.95
Learn to Read 5	S/McMillan	9.95	8.95
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Glider	S/McMillan	9.95	8.95
Survival	S/McMillan	9.95	8.95
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Speech Marks	Sinclair	7.95	7.15
The Apostrophe	Sinclair	7.95	7.15
Capital Letters	Sinclair	7.95	7.15
Alphabet Games	Sinclair	7.95	7.15
Castle Spellerous	Sinclair	7.95	7.15
Micro Prolog	Sinclair	24.95	22.00
Jet Pac	Ultimate	5.50	4.95
Lunar Jetman	Ultimate	5.50	4.95
Atic Atac	Ultimate	5.50	4.95
Sabre Wulf	Ultimate	9.95	8.95
Stonkers	Imagine	5.50	4.95
Zzoom	Imagine	5.50	4.95
Pedro	Imagine	5.50	4.95
Alchemist	Imagine	5.50	4.95
Cosmic Cruiser	Imagine	5.50	4.95
Birds & Bees	Bug Byte	5.95	5.35
Mr Wimpy	Ocean	5.90	5.30
Eskimo Eddie	Ocean	5.90	5.30
Royal Birkdale	Ocean	5.90	5.30
Pogo	Ocean	6.90	5.30
Hunchback	Ocean	6.90	6.20
Moon Alert	Ocean	5.90	5.30
Kong	Ocean	5.90	5.30
Cavelon	Ocean	5.90	5.30
Chinese Juggler	Ocean	5.90	5.30
Fighter Pilot	Digital	7.95	7.15
Night Gunner	Digital	6.95	6.25
3D Death Chase	Micromega	6.95	6.25
Codename Mat	Micromega	6.95	6.25
Haunted Hedges	Micromega	6.95	6.25
Mountains of Ket	Incentive	5.50	4.95
1984	Incentive	5.50	4.95
Millionaire	Incentive	5.50	4.95
Temple of Vran	Incentive	5.50	4.95
Meteoroids	DKT	4.95	4.50
Dictator	DKT	6.95	6.50
Speed Dural	DKT	5.95	5.35
Jet Set Willy	S/Proj	5.95	5.35
Tribble Trouble	S/Proj	5.95	5.35
Manic Miner	S/Proj	5.95	5.35
The Pyramid	Fantasy	5.50	4.95
Doomsday Castle	Fantasy	6.50	5.85
Beaky/Eggsnatch	Fantasy	5.50	4.95
Classic Adventure	M/House	6.95	6.25
4D Terror Daktil	M/House	6.95	6.25
Abersoft Forth	M/House	14.95	13.00
Melbourne Draw	M/House	8.95	8.00
Hur'g	M/House	14.95	13.00
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Britain

Aylesbury Computer Club: 12 Long Plough, Aston Clinton, Aylesbury, Bucks.
Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street, Aylesbury (5181 or 630867).
Basildon: Roundacre Microcomputer Users' Club. J Hazell, Basildon 285119/416333. Meetings every Wednesday 7.30 to 10.30pm.
Blackburn Computer Club: 1 Sutton Street, Feniscowles, Blackburn, Lancashire. Tel: B'burn 60033 (office hours) or 28127. Meets twice a month, subscription £5 (£3 juniors).
Bristol Yate and Sodbury Computer Club: 99 Woodchester Yate, Bristol, BS17 4TX.
Cardiff ZX Club: Steve Smith (0222) 593237 or Mike Hayes (0222) 371732. Meets twice a month.
Colchester Sinclair User Group: Richard Lown, 102 Prettygate Road, Colchester CO3 4EE.
Computer Club International, 6 Drumdoon Walk, Downpatrick, N. Ireland BT30 6UF.
Cornard Sinclair User Group: Neil MacDonald, 15 Potkiln Road, Great Cornard, Sudbury, Suffolk CO10 0DA.
Crewe and Nantwich Computer Users' Club: J E A Symondson, 46 London Road, Stapeley, Nantwich, Cheshire CW5 7JL.
Daventry & District Computer Club: c/o Daventry Ex-servicemen's Club, Market Square, Daventry, Northants.
Doncaster and District Micro Club: John Woods, 60 Dundas Road, Wheatley, Doncaster DN2 4DR; (0302) 29357.
Eastwood Town Microcomputer Club: E N Ryan, 15 Queens Square, Eastwood, Nottingham NG16 3BJ.
Edinburgh: Edinburgh Home Computing Club. John Palmer (031 661 3183) or Iain Robertson (031 441 2361).
EZUG-Educational ZX-80-81 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.
Furness Computer Club: R J C Wade, 67 Sands Road, Ulverston, Cumbria (Ulverton 55068). Meets every other Wednesday.
Glasgow ZX-80-81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241).
Gloucester: Mid-weekly Spectrum User Group. Barry Ledbury, 8 Linnet Close, Gloucester GL4 9XA (0452) 23186.
Gravesend Computer Club: c/o The Extra Tuition Centre, 39 The Terrace, Gravesend, Kent DA12 2BA. Bi-monthly magazine and membership card.
Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).
Hobbit Appreciation Society, 12 Middlefield Lane, Hinckley, Leicestershire LE10 0RB. Free newsletter with SAE.
Independent QL Users Group; Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes MK11 1JU. Tel: 0908 564271. Publishes newsletter.
Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourock, Renfrewshire PA19 1PL (Gourock 39967). Meets every other Monday at Greenock Society of the Deaf, Kelly Street, Greenock.
Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).
Lambeth Computer Club: Robert Baker, 32 Heatherington Road, London SW4 7NX.
Liverpool ZX Club: Meetings every Wednesday 7pm at Youth Activities Centre. Belmont Road, Liverpool 6. Keith Archer, 031-236 6109 (daytime).
Llanelli Computer Club: 40 Tan-Y-Bryn, Burry Port, Dyfed. Llanelli 56917.
Manchester Sinclair Users' Club: Meets every Wednesday, 7.30pm, at Longsight Library, 519 Stockport Road, Longsight — 061-225 6997 or 061 445 6316.
Meopham: National ZX Spectrum User Club. Guy Fullalove, Woodcotes, Camer Park, Meopham, Kent DA13 0XS. Bi-monthly newsletter, subscription £1.50. Send SAE for details.
Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.
Micro Users' Group: 316 Kingston Road, Ewell, Surrey KT19 0SY.
Mid-Kent Micro Club: Meets once monthly. Enquiries to M Gates, 65 Buckland Road, Maidstone ME16 0SH.
Mill Lane Association Computer Group: Bryan McAlley, 1 Cowleaze, Chinnor, Oxfordshire. (0844) 52426.
Newcastle (Staffs) Computer Club: Meetings at Newcastle Youth and Adult Centre, Thursday, 7.30. Enquiries to R G Martin (0782 62065).
North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.
Northern Ireland Sinclair Users' Club: P Gibson, 11 Fitzjames Park, Newtownards, Co Down BT23 4BU.
North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 Monday, 6pm.
Nottingham Microcomputer Club: ZX-80-81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.
Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent (Orpington 20281).
Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.
Regis Amateur Microcomputer Society: R H Wallis, 22 Mallard Crescent, Pagham, Bognor Regis, West Sussex PO21 4UU.
Roche Computer Club: 8 Victoria Road, Coop Rooms, Roche, Cornwall: 0726 890473. Twice weekly meetings, Monday and Friday.
Saltcoats Computer Club: Colin Borland, 117 High Road, Saltcoats, Ayrshire KA21 5SD. Weekly meetings.
Sinclair Postal User Group: 24 St. Mary's Way, Code SUL, Chigwell, Essex IG7 5BX. Produces magazine with competitions.
Scunthorpe ZX Club: C P Hazleton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).
Sheffield: South Yorkshire Personal Computing Group. R Alderton (0742 20571), S Gray (0742 351440), P Sanderson (0742 351895).
Sinclair Amateur Radio User Group: SAE or two IRCs for details. Paul Newman G4 1NP, 3 Red House Lane, Leiston, Suffolk IP16 4JZ.
Sittingbourne: Anurag Vidyarth (0795 73149).
St Albans: Bi-monthly meetings and a magazine. Details from Adam Slater, 40 Watford Road, St Albans, Herts AL1 2HA. (0727 54176).
Stratford-on-Avon Computer Club: Meets on the second Wednesday of every month. Telephone: 0789 68080 for details.
Swansea Computer Club: B J Candy, Jr Gorlau, Killay, Swansea (203811).
Swindon ZX Computer Club: Andrew Bartlett, 47 Grosvenor Road, Swindon, Wilts SN1 4LT; (0793) 3077. Monthly meetings and library.
Sutton: Sutton Library Computer Club, D Wilkins, 22 Chestnut Court, Mulgrave Road, Sutton, Surrey SM2 6LR.
Washington Sinclair Users' Club, Columbia Community Centre, Tyne and Wear. Meets twice a month, tel. 4179483 or 4167367.
West Sussex: Midhurst and District Computer User Group. Enquiries to V Weston (073 081 3876), R Armes (073 081 3279).
Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068).
Universal ZX Club: Postal club for Spectrum owners in the U.K. and abroad. C. Shaw, 1 Swiss Walk, Batley, W. Yorkshire.
ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH. Please include sae. Meetings twice monthly.

Overseas

Australia: Australian ZX Users' Newsletter, incorporating QL User. Paul Janson, P.O. Box 397, Dapto 3530, Australia. Also seeks unpaid contributions for the newsletter.—W.A. ZX Users' Group, Garth Gregson, 34 Chester Street, South Fremantle 6162. Phone 3351671.
Austria: ZX User Club, Thomas Christian, c/o Wissenschaft Forscht e. V., Postfach 141, A1190 Vienna. Meets every first Friday of the month. Telephone 0222-44 32 050 for details.
Belgium, France and Luxembourg: Club Micro-Europe, Raymond Betz, 38 Chemin du Moulin 38, B-1328 Ohain, Belgium (32/2/6537468).
Denmark: Danmarks National ZX-8081 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.
ZZ-Brugergruppen i Danmark, Boks 44, 2650 Hvidovre, Gratis medlemskab og gratis blad til enhver interesseret.
J Niels-Erik Hartmann, OZ-ZX-Radioamator, Bruger Gruppe, Bredgade 25 DK-4900, Nakskov.
Finland: ZX-kerho, c/o Kalevi Hamalainen, Siltakatu 9 A 8, 33100 Tampere 10, Finland. Phone 35831-34238. Publishes quarterly paper.
France: Yves Chapron, no. SUS-1047, Rue du Puy, La Terrasse, 38660 Le Touvet, France. Specifically for users in the Alps.
Germany: ZX Club, a postal club; contact Aribert Deckers, Postfach 967, D-7000 Stuttgart 1, West Germany.
Greece: Athens Spectrum Club, Paris Stamelos, Spetsou 2, isi22 Marousi, Athens, Greece.
Indonesia: Jakarta ZX-80/81 Users' Club, J S Wijaya, PO Box 20, Jkukg, Jakarta, Utara, Indonesia.
Irish Amateur Computer Club: Martin Stapleton, 48 Seacourt, Clontarf, Dublin 3. (331304).
Irish Sinclair Users Club: PO Box 1238, Dublin 1. Publishes a newsletter. Send SAE for details.
Italy: Sinclair Club, Via Molino Vecchio 10/F, 40026 Imola, Italy.
Genova Sinclair Club; Vittorio Gioia, Via F Corridoni, 2-1, telephone 010 3125 51.

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Micro-Europe: Belgium or Club Paris-Micro, 19 Rue de Tilly, 92700, Colombes, France; associated with Club Micro-Europe.

The Netherlands: Clive's Bits and Bytes, Nicholas Beets Straat 164, 6416 VX Heerlen. Telephone 045-423024. Both Spectrum and ZX-81 users welcome.

Republic of Ireland: Irish ZX-8081 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliath 1.

Singapore: Sinclair Users' Group: Eric Mortimer, 1D Wilmer Court, Leonie Hill Road, Singapore.

South Africa: Johannesburg ZX-80-81 Computer Users' Club: S Lucas, c/o Hoechst SA (Pty) Ltd, PO Box 8692, Johannesburg.
Johannesburg ZX Users' Club: Lennert E R Fisher, PO Box 61446, Marshallstown, Johannesburg.
Dumont and Syndercombe Amateur Computer Club. Jean-Pierre Dumont would like to correspond with ZX-81 owners via tapes. Write to 8 Kipling Road, Farrarmere, Benoni 1500, Transvaal.

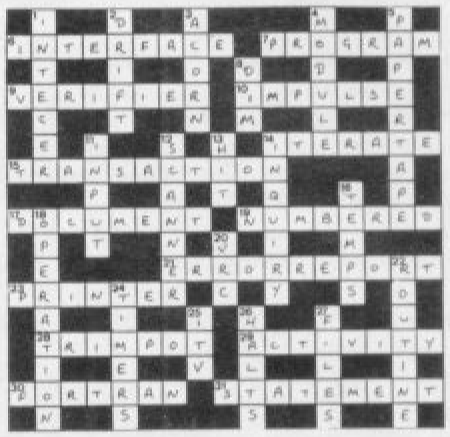
ZX SA Club: Jonathan Jones, House 14, Anglo Alpha PO Box 15, 1725 Roodepoorf.

Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana. International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine. Spanish ZX Micro Club: Apartado 181, Alicante (Costa Blanca), Spain.
ZX Club Spain; C Benito PO Box 3253, Madrid, Spain.

Swedish ZX-club: Sinclair Datorklubben, Box 1007, S-122, 22 Enskede.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611.—Harvard Group, Bolton Road, Harvard MA 01451: (617 456 3967).—SAF Users' Group, 2749 Eden Road, Leslie, Michigan 49251.—ZX Users Group of New York, Box 560 Wall Street, New York, N.Y. USA 10005. Subscription $15US, publishes international newsletter. Seeks newsletter exchange with other groups.

Solution to crossword



Answers to MIND GAMES

1. Slaymore loses the argument but wins the fight.
2. MS. The author's name is Mike Singleton. The two characters which must fight or fulfill the quest are Luxor and Morkin.
3. Mastervision which is part of Mastertronic. **Volcanic Dungeon, Black Crystal, Wrath of Magra.**
4. A tree structure is generated by a computer and contains the possible moves in a strategy game from which winning moves can be deduced. It is infinite.
5. Scott Adams wrote The Hulk. Banner is bound to a chair in the control room. Transformation occurs when he bites his lip.
6. Henry.
7. Ringways. Could have been Ofnir, Drapnir, Skornir, Skalir, Felstrong or Grimnir.
8. Rope a boat to cross the river. The ring is by the lake or with Gollum. Bard kills Smaug with an arrow.
9. Paddington, Victoria, or Aldgate by hansom cab. Mrs Brown and Mrs Jones were murdered. The name of the paper read by Watson is The Daily Chronicle.
10. A grandfather clock. Nine time periods. In the clock.

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FUNCTIONS

AND (bit-by-bit)
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CHAR$ number to 2 characters
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DEC hexadecimal to decimal
DPEEK double PEEK
FILLED filled area
HEX$ decimal to hexadecimal
INSTRING string search
MEM free memory
MEMORY$ all of memory as a string
MOD modules
NUMBER 2 characters to number
OR (bit-by-bit)
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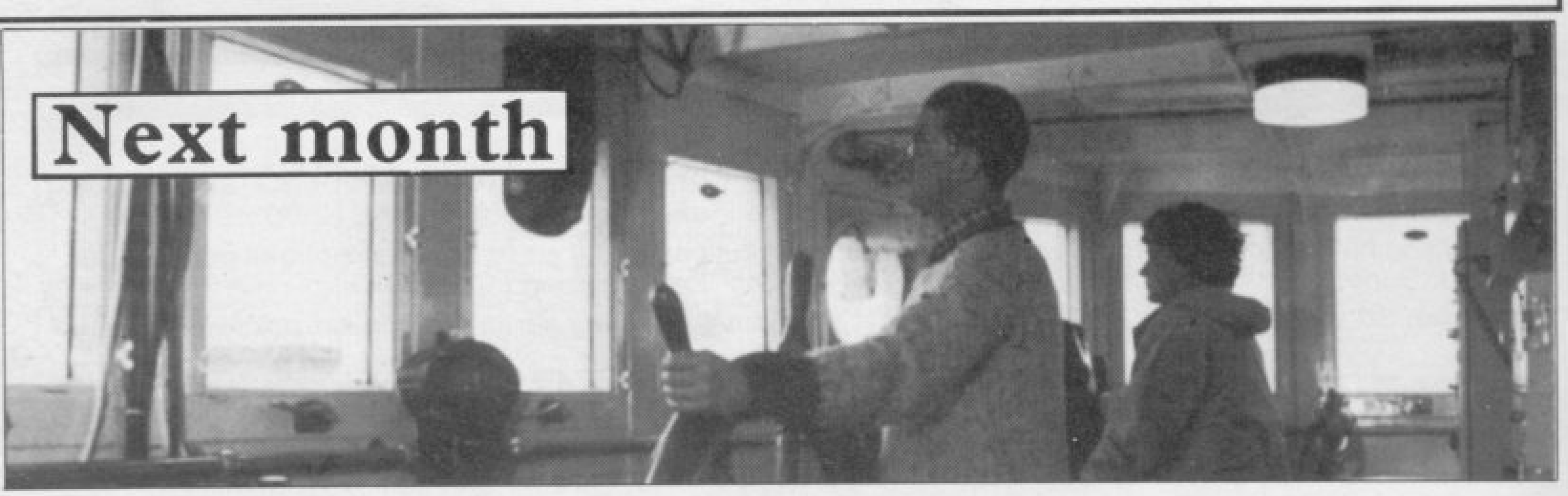
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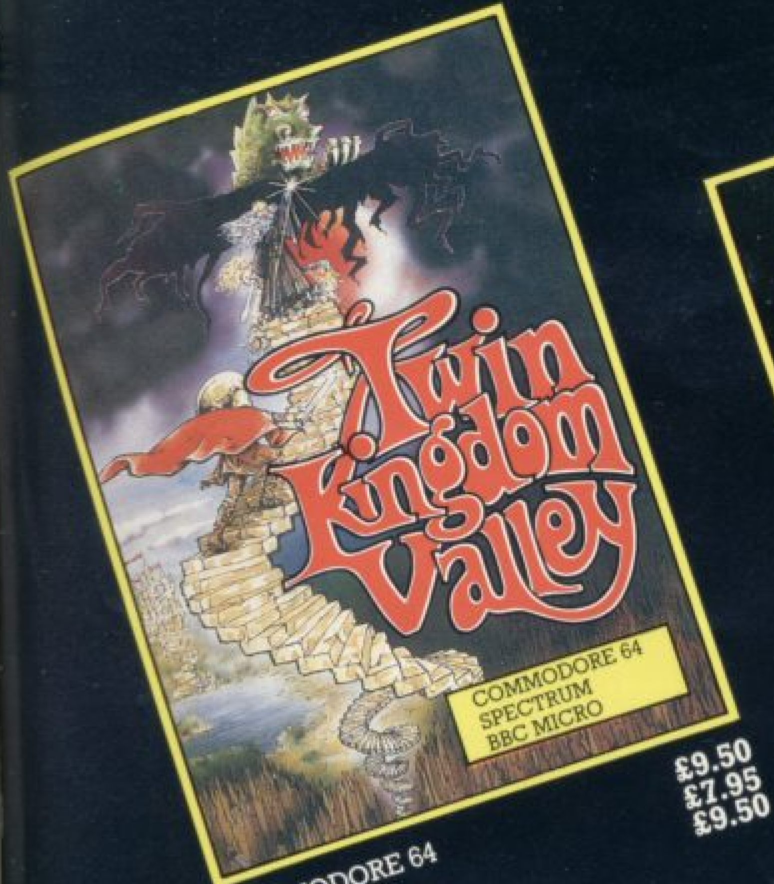
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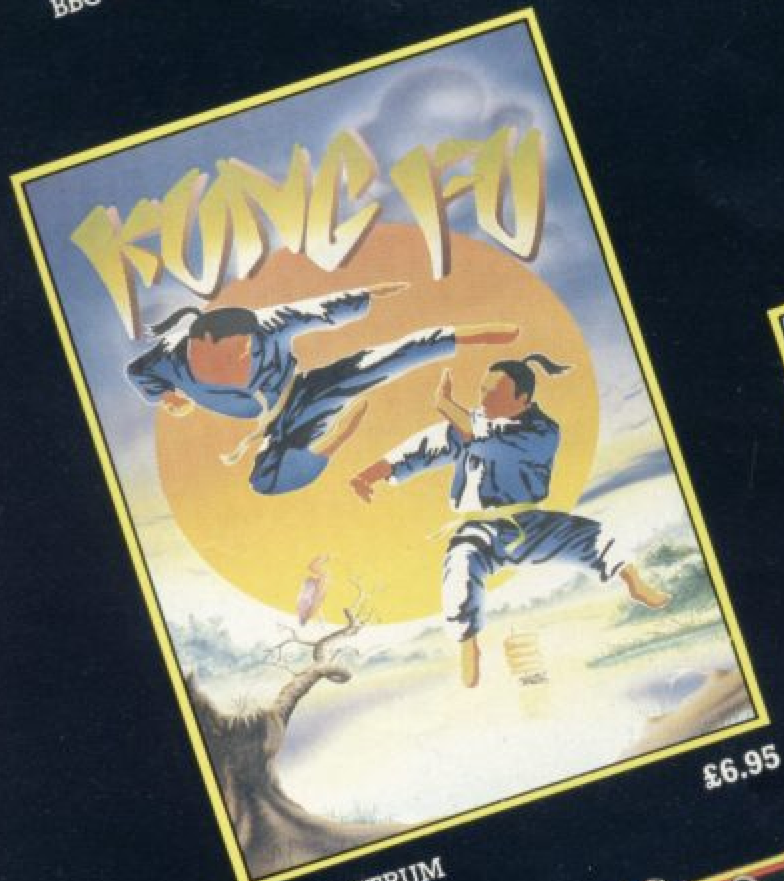
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